GAS JOURNAL, FEB. 9, 1938

VOL. 221. 90th YEAR. No. 3899.

Editorial Notes

A Comprehensive Survey

FAR beyond the range even of the large number of proprietors to whom it was more immediately addressed, keen interest will have been taken in the comprehensive survey of the situation made by Sir David Milne-Watson, as Governor, at last week's Annual General Meeting of the Gas Light and Coke Company. Year by year stupendous figures become still more stupendous in the piling-up of records by this giant among the public utilities of this country, and of the world. Calm reflection is needed to induce adequate appreciation of the truly wonderful achievements detailed by the Governor as the ordinary, everyday experience of the Company; and this calm reflection must inevitably lead to the conclusion that the great Gas Industry still has "the ball at its feet."

With competition so keen, and with every class represented among the consumers, the great reluctance of the Directors in deciding upon an increase in the price of gas will be readily understood, but as during the year the cost of raw materials (other than coal) went up by 15%, and wages increased by 6% under the national agreement, it became essential to put up the price to some extent. The rise, at 0·3d. per therm, was made as small as possible—in fact, it barely covers the increase in the costs just referred to, and only means a halfpenny a week to the average automatic consumer, and a penny per week for an ordinary consumer whose gas bill is from 25s. to 30s. a quarter. A reduction of £100,000 in the amount carried forward in the accounts marks the extent to which the proprietors have been affected by the impossibility of avoiding a time-lag in the adjustment of the price to rising costs at a time like the present.

Such an extremely modest addition to the price of gas as has been forced upon the Directors should not prejudicially affect the customary favourable trend of the consumption curve, for in many other directions consumers have experienced, speaking proportionately, considerably larger rises in prices of commodities. So that proprietors will look forward to receiving twelve months hence figures of consumption increase at least as favourable as those for 1937, which was on the whole a warmer year than its predecessor. In addition to this, 1936 was a Leap Year, and so contained an extra day, which made the 1937 increase in sales of 1·32% the more satisfactory. Sir David referred to a move that is now on foot which may lead to the formation of a London Regional Advisory Committee on Smoke Abatement, and should this come about the Gas Industry, as the purveyors of alternative smokeless fuels, will be called upon to play a leading part. So far from doubting the practicability of smoke abolition, the Governor declared: "If the State and the local authorities will take counsel seriously with the fuel industries of the country, and if this good cause is favoured with a fraction of the thought, effort, and money that goes into some other causes—not all of them as worthy—I believe that in a very few years we shall see substantial smoke abatement in London, and that total abolition can follow not long after."

Thus the prospects are bright for the further expansion of a business already of vast dimensions, as figures revealed at the meeting showed.

Take a look in at the Company's Rental Department, which has an efficiently mechanized system of records and accountancy at Imperial House, Fulham, adjoining Watson House. The magnitude of the task allotted to them will be gathered from the fact that the Company now have over 1,650,000 separate accounts on their books. The Rental Department have to deal with transactions respecting over 2,000,000 appliances on the district—there are some 1,330,000 appliances on hire, and roughly 750,000 on hire-purchase. In addition, it was last year necessary to handle the charges for 409,000 tons of coke, which was about 25,000 tons more than in the preceding year. The number of separate individual orders received for coke was roughly 676,000, one-half of them being received over the telephone by a staff specially trained for that purpose. On the peak day of the year, over 6,200 of these orders were successfully handled. Between 7,000 and 8,000 accounts of ordinary gas consumers are handled every week-day, while prepayment consumers number close upon a million. The net increase in the number of appliances on the district amounted in 1937 to no less than 274,000, and there are now some 40,000 gas refrigerators installed in the Company's area.

Along with the expansion of domestic demands it is satisfactory to note that the industrial business of the Company continues to grow. One by one the great national newspaper offices, in modernizing their plant and equipment, call in the aid of gas, not merely for the important heat processes connected with the handling of metal in newspaper production, but increasingly, also, for the heating, water heating, and air-conditioning of their buildings, and so many national newspaper offices can't be wrong. Again, almost every big hotel and restaurant, and all the great chain catering establishments, of London use gas for the whole, or the great bulk, of their

cooking, a fact which becomes of peculiar significance when it is reflected that experts such as these delve minutely into questions of cost.

The keen interest which the Company take in street lighting is certainly rewarded, inasmuch as the very large share of London's street lighting for which they are responsible does not diminish. During last year ten additional long-term agreements were made—two of them for fifteen years. The all-sufficient gas lighting which the Company provide for so many of the thoroughfares of the Metropolis is not only good business for London, but also first-rate propaganda for other parts of the country.

Finally, we would direct attention to the remarks of the Governor upon the advantages of co-operation, in the hope that there may be an extension of the policy which is being tried-out with good results in London and the Home Counties. The refrigeration campaigns for the past two years, along with a number of other publicity and sales campaigns, have been carried out co-operatively, and Sir David feels that such co-operative action by gas companies on a regional basis is one of the most important and hopeful developments in the Industry. Such an opportunity must not be neglected.

"Gas Gallery"

We are always pleased to see the British Gas Federation in action, denoting that, an occasion having arisen for exerting the full strength of the Gas Industry, the machinery for such exertion has been not only available, but ready to start up.

Regarded in this light, the appeal recently made to all gas undertakings and contractors to support a permanent gas gallery at the South Kensington Science Museum will not fall on deaf ears. The fact that the project is sponsored by the B.G.F. means that it has been given full consideration by all sections of the Industry, and that jointly they have decided that it must go forward with as little delay as possible. It can be taken as certain that they would not have issued an appeal for funds of an extraordinary nature without the conviction that the proposed step is very strongly in the interests of the Industry, and so we would urgently impress the need for a quick response.

It is important to bear in mind one or two points in connexion with the exhibit. It will in no sense be a museum piece. The fate of museum pieces in the Science Exhibition at South Kensington has already befallen the majority of the exhibits which once represented gas. We believe that they repose in a cellar deep and dark, and, indeed, the only representation of the Gas Industry which remains on view to the public is the beautiful model of a gas-works presented a year or two ago by the Gas Light and Coke Company. This is on show because, far from being a museum piece of purely historical interest, it is a scientific exposition of the modern development of gas manufacture, and intensely fascinating from the technical point of view. Those of us who knew the circumstances have long been envious of the extensive exhibits by which other industries, including competitors with our own, have been able to cater for the tastes of the scientifically and technically minded, and especially impress upon the younger generation the modernity and romance of their processes.

We realized, in fact, that it was only a question of awaiting the right opportunity, and that when this came along the Gas Industry could not hesitate to take it. The British Gas Federation has now been offered a favourable position, and needless to say the plans must go forward with all speed for its occupation by an exhibit worthy of the Industry's prestige. We shall thus be remedying what has for long been an obvious defect in our equipment, the delay being compensated to some extent by the opportunity of staging something which will be completely up to date.

Those who are likely to be most directly interested will have received full details of the appeal from the B.G.F., and it is clear that the proposed gas gallery is far removed from the ordinary conception of a museum, and from the ideas of antiquity which are customarily associated with the very name. That this well accords with the ideas of the authorities at West Kensington is shown by the extract from their recent report in which they point out that "the object of the Exhibition is, in the first place, education. The community is becoming increasingly conscious of the reaction of science in everyday life. New applications of scientific discovery are entering into every phase of it, and a well-equipped exhibition is the best means of ensuring that intelligent understanding of the developments and of the benefits they bestow." This implies, of course, that the gas exhibit in all its sections will have to be revised and added-to from time to time—a condition which the B.G.F., as its sponsors, have well in mind.

Latest figures show that visitors to the Exhibition number 1,250,000 yearly, who come from all parts of the country. Moreover, the numbers have a rapidly increasing tendency, because education authorities are more and more providing facilities for teachers, students, and young people generally to visit it. The continued absence, therefore, of a worthy gas exhibit would be lamentable; there can be no two opinions about the importance of emphasizing, especially to the rising generation, the close association of the Gas Industry with modern conditions of civilized life, and the fact that by evolution over a whole century it represents to-day the most scientific method of utilizing the coal resources of the country. The appeal of the B.G.F. is one that is bound to commend itself to the Industry, and we look forward to the day when gas is represented in this national institution where at present it is conspicuous by its absence.

We believe that Mr. W. J. Smith, as Joint Secretary of the Federation, will be pleased to hear from anybody who has models, sketches, or other material which might be useful to those who have to make final plans for the exhibit.

The Cooking Load

In last week's "Journal" we discussed the incidence of electrical competition on the gas cooking load, calling attention once again to the broad statement made by Sir David Milne-Watson last autumn that a complete change-over from gas to electric cooking must prove disastrous economically to the consumer and to the community. At the same time we expressed the hope that this statement, factual as it is, would not blind any gas undertaking into the idea that the cooking load is "safe," for, surprising as it may seem, we have heard of instances where the figures put forward by Sir David to show what the economic result of such a change-over would be have been used as a justification of a policy of doing exactly nothing. Any such policy is, as we said, fraught with the greatest danger. On the appeal of fashion, and with what amounts to a subsidy, electrical inroads can be, and are being, made. By re-selling the gas cooking load we must ensure that these inroads are but temporary.

We must capitalize the advantages possessed by gas for cooking—its economy and flexibility, automatic control of oven temperatures, and its speed as compared with electricity. In connexion with this question of speed we referred last week

to a Paper recently given at a meeting of the Institution of Electrical Engineers by Mr. J. N. Waite, Electrical Engineer to the Hull Corporation. In that Paper the Author maintained that critics of the electric boiling plate are not students of human nature, and that once people have become accustomed to the possibilities of an electric cooker their habits adapt themselves to its possibilities. "The housewife," he said, "will adjust her habits to the means at her disposal, and, having done so, will forget all about quick boiling." At the same meeting of the Electricals, Mr. O. W. Humphreys, of the General Electric Company, presented a Paper on the design of domestic electric cookers, a very large portion of which was concerned with the long-continued efforts of the electrical interests to improve the efficiency of the boiling plate and so speed-up its use. Having pointed out that the actual efficiency obtained must depend to a large extent on the type of vessel used, Mr. Humphreys went on to say that the least satisfactory aspect of most modern boiling plates is their insulation resistance when hot. Advance has been made, but "no manufacturer is really satisfied with this advance." The Paper is a severely technical one, and it indicates how desperately the electricians have tried to increase the speed of boiling plates, and work to this end is still going on. Of the high-voltage exposed resistor type of boiling plate Mr. Humphreys was frank in speaking of its danger to the user, proneness of the resistor to injury, and low efficiency. Of the low-voltage plate of the same type, he said: "From the point of view of psychological appeal and ability to create an *impression* of speed"—the italics are ours—"the low voltage plate is pre-eminent. Its principal disadvantages are that its initial cost, including the transformer, is substantially higher than that of any other type of plate, and that, in common with all plates which depend mainly on radiation for heat transfer, its efficiency is low, especially when used with aluminium or other utensils having bright bases." Then, with the cast-iron embedded method, if badly distorted pans are used, the casting may reach a temperature considerably higher than that obtained with no vessel, and cracking may then occur after quite a short period of use. It seems to us that all is not well with the electrical boiling plate, and that Mr. Waite is a little optimistic in suggesting that the housewife will adjust her habits to the means at her disposal, and, having done so, will forget all about quick boiling.

The Consumer's Reaction

We also referred last week to the Paper which Mr. A. G. Holtam, of the Cheltenham and District Gas Company, gave at a meeting of the Western Junior Gas Association. That Paper, which will be found on later pages of our issue to-day, is concerned with rural gas service, and the Author's comments on the cooking load have much significance. With the extension of gas mains into country districts where for some years electricity had been available and where the only competition electricity had to face was from oil and solid fuel, practically the whole of the electric cooking load has been gained by gas, and substantial sales of gas cookers have been made to households previously using solid fuel or oil. "A major consideration," said Mr. Holtam, "has been speed, especially of the hotplate." There is, of course, another aspect of this replacement of electricity by gas—that it was a question of modern gas equipment competing with modern electric appliances, and not, as is unfortunately so often the case, ugly and obsolete gas appliances competing with up-to-date enamelled electric cookers. Where such gas appliances remain on the district the gas cooking load is in no sense "safe."

We have mentioned the great advantage which gas has in automatic control of oven temperatures. In regard to electric cookers, Mr. Waite observed in his Paper that "automatic regulation of oven temperatures is a new development which has many desirable features and is certain to be popular with housewives," but, "increase in hiring charge will tend to discount this popularity. . . . For the poorer class of household (which forms the majority) a low rental is more important than refinements, so that it may be anticipated that the use of automatic regulation will be restricted to the larger cookers used by households where the household budget does not have to take a strict account of small sums." There is no need for any restriction in the installation of thermostatically controlled gas cookers—a fact which is not a source of pleasure in the electrical camp.

We get an illuminating picture of the consumer's reaction to gas and electric cooking—modern equipment in each case—from a Paper given by Mr. F. C. Edmondson, General Manager of the Perth Electricity and Gas Department, to the Australian Gas Institute. As far as Australia is concerned the Department Mr. Edmondson controls is unique in combining the supply of both gas and electricity. The policy of the Department, the Author explained, is to offer gas and electricity at such prices that, taking into account efficiencies of utilization, there is on average nothing to choose from the economic point of view between the two sources of energy. Actually, in the smaller household electricity has a slight advantage, in the larger households the slight advantage is with gas, while with the average consumer gas and electricity are on an equivalent basis. Free development is the Department's aim, and the consumer is swayed neither one way nor another as to which agent he should employ for cooking. The same salesmen sell both types of apparatus, gas and electric, and obtain the same credit for the sale of either. Mr. Edmondson gave figures of cooker sales covering the years 1928 to 1937. In that period the sales of gas cookers amounted to 13,414; in contrast, the number of electric cookers sold was 631. In other words, despite the fact that gas and electricity in the household—as we have said, taking into account their efficiency of utilization—cost the same with equal use, the gas cooker sales outnumber electric cookers by roughly twenty to one. With the added advantage of economy, the Gas Industry in Great Britain can assuredly find cause for encouragement in these figures; but it must ensure that the competition is not between old-fashioned and unattractive gas cookers and the most up-to-date appliances which the electricity industry has to offer. And there exist, as we have pointed out, areas where the gas cooking load needs to be re-sold.

The Crack of the Whip

The debate in the House of Commons on Tuesday last was devoted to a consideration of Part III. of the Coal Mines Bill, the purpose of which was to extend for a further period of five years Part I. of the Coal Mines Act, 1930, under which the district selling schemes now in operation were set up. This long extension of the period was viewed with great apprehension by all those who, having had experience of the working of the schemes, realized that the provisions for the so-called protection of the consumer were entirely inadequate. It is true that Section 8 of the Bill proposes to make certain

changes in the Committees of Investigation which at present constitute the sole remedy of the consumer and also to set up an Appellate Tribunal; but as such Tribunals are not to be provided with the powers necessary to enable them in all cases to take immediate and effective action, their efficacy will obviously be little better than that of their predecessors.

In spite of the fact that practically every Member of Parliament who spoke recognized the necessity for safeguarding consumers in the face of the coal monopolies that had been established, and in spite of the fact that a large number of Members conclusively showed that the safeguards, both existing and contemplated, were and would be completely ineffectual to protect the public, the Government Whips won the day, aided as they were by the abstention from voting of the Labour Party. The Debate ranged round two amendments put down by Sir Reginald Clarry and a large number of Conservative Members, a deputation of whom had, earlier in the day, seen the Prime Minister. The effect of these amendments would have been to limit to about one year the extension of Part I. of the Coal Mines Act, and, at the same time, to provide for a public enquiry into the operation of the selling schemes.

It may be noted, in passing, that by reason of the Government's determination to stifle debate, the title of the Bill had been so drawn as to reduce discussion to the narrowest compass. The only plea the Government could advance in resisting the amendment was that to limit Part I. of the Act in the manner suggested would create doubt and confusion, with the result that the Coal Industry, as it was alleged, would seriously suffer. A more feeble argument was never put forward, and it was one which certainly did not appear to convince Members of the House. Something, however, had to be said to afford some justification for the docility of the rank and file. With a great flourish of trumpets, the President of the Board of Trade read some vague assurances from the coalowners to the following effect:

(1) That no obstacles would be placed in the path of those who, for good reasons, desired to change their suppliers, provided that the only reason was not to try to get a lower price.

(2) That a purchaser would be enabled to refer to a committee of investigation a complaint in respect of any price that might be quoted to him.

(3) That in all districts the executive boards would be prepared to meet from time to time representatives of the consumers to discuss general questions appertaining to the supply of coal arising out of the selling schemes, and this would not exclude general questions with regard to price.

This method of legislating for the protection of consumers certainly did not please the House; nor were Members placated when the Government spokesman endeavoured to show that it was impossible to legislate on the matter. To anyone with a sense of humour there was distinct cause for merriment—if the matter had not been so serious—to hear at the end of a lengthy debate and palaver of over seven hours that the much-vaunted protection of consumers—viz., that of committees of investigation—was only available to those consumers who bought actually in the first instance from the coalowners. Apparently all those who buy through factors or from the selling subsidiaries of the coalowners are unable even to have their case heard by a committee of investigation. The debate constituted one of those affable solemn farces which are so often to be seen at Westminster.

It remains to us only most warmly to thank and heartily to congratulate those Government supporters who have at least induced the Government to meet them to some extent, and who took their courage in both hands and voted, as their conscience dictated, in favour of the amendment. As we are just going to press it is impossible to make more than a cursory examination of the position, and it may be possible to amplify this in a subsequent issue.

Research Associations.

The Annual Report of the Department of Scientific and Industrial Research which has just been published records substantial progress in practically all directions of the Department's work, both in the researches carried out by the research establishments of the Department itself, and in the laboratories of the research associations formed on a co-operative basis in various industries under the Department's auspices. The associations' financial resources—and this is a matter which the Gas Industry will note—maintain an upward tendency. The aggregate income subscribed by industry has now reached practically £250,000, and the Government's grants amount to nearly half that sum. During the year covered by the Report (Oct. 1, 1936, to Sept. 30, 1937) the general position of co-operative research on refractories was considered, and the Laboratories at Stoke-on-Trent of the British Refractories Research Association, which, of course, has been so solidly supported by the Gas Industry, were visited by a D.S.I.R. Committee. The latter, it is stated in the Report, were "well satisfied with the work done under the distinguished direction of Dr. Mellor and were impressed with the ability of the scientific staff." The new terms of grant provide for a minimum industrial income of £5,000 per annum, to be augmented by a block grant of £4,000. With additional grant against further industrial money, an income of £13,000 can be reached. A new research organization is that of the pottery industry. To finance this, the Pottery Manufacturers' Federation agreed to provide an income of at least £10,000 per annum for five years. The D.S.I.R. welcomed this decision; and the new association is in the happy position of starting its existence with an assured income of at least £15,000 per annum. The Department has suggested the formation of a Joint Advisory Committee representative of the Refractories and Pottery Research Associations, to ensure close collaboration and economical working.

Asbestos Cement Pipes.

Reference to the use of asbestos cement pipes was made by Mr. A. G. Holtam, of the Cheltenham and District Gas Company, in a Paper to the Western Junior Gas Association, in which he set out a table giving average mainlaying costs covering some 140 miles of country pipelines. He stated that the asbestos cement main laid in his area of supply had given no trouble since it was put down two and a half years ago. On this subject of asbestos cement pipes, an investigation was put in hand some time ago by the Australian Gas Light Company, and the results so far obtained were outlined in the December issue of the Bulletin of the National Gas Association of Australia. Specific tests—made by burying a pipe under a road subject to continuous heavy lorry traffic for a period of three years and by comparing the effect of pick blows on asbestos cement and spun iron pipes—furnished confirmation of the opinion that the mechanical strength of asbestos cement pipes is adequate for gas mains. Studies were made both of the porosity of the pipe walls under varying moisture conditions and of the types of joint which may be used. Dry asbestos cement pipes were found to be definitely porous, but when the pipe material is saturated with water it is impervious to gas. Saturation of the pipe material, it is stated, occurs at a moisture content in the neighbourhood of 19%, but even at moisture contents as low as 13% the leakage from the pipe is negligible. Tests conducted on a 2 in. diameter trial main, carried out after a period of dry weather, showed no signs of leakage. It has also been found that perfectly gas-tight joints can be made by means of a sleeve and two rubber rings of circular cross-section, the pipes being spigoted at each end. The service connexions available make satisfactory gas-tight joints. The results of the investigation are held to be sufficiently promising to justify more extensive tests under service conditions in Sydney. An interesting point mentioned in the Bulletin is that the actual moisture content of asbestos cement pipe buried in the soil has been found to

be dependent on the texture as well as the moisture content of the soil in contact with it. Thus, for example, it has been shown that asbestos cement pipe will remain saturated with moisture when in contact with sands containing as little as 2% moisture, whereas, when buried in clay, it is necessary that the clay shall contain 25% or more of moisture to ensure complete saturation of the pipe wall.

Railway Station Lighting.

A good deal of attention has been directed during the past two years to the problem of improving the standard of the gas lighting of railway stations. The fact that the Gas Industry is a most important customer of the railways of this country has been emphasized, and an endeavour has been made to persuade the railway companies to extend their use of gas not only for lighting but for heating, cooking, water heating, and refrigeration. As far as lighting is concerned, a considerable measure of success has been achieved, but it is obvious that much remains to be done by individual gas undertakings in negotiation with the railway authorities. In the case of the London, Midland, and Scottish Railway, an agreement has been reached in regard to the maintenance of lighting installations, and it will be recalled that at last year's annual meeting of the National Gas Council Sir David Milne-Watson referred to the many contracts which had been secured for the continuance of gas lighting on an improved basis on railway premises. No generally applicable scheme of maintenance—and upon adequate maintenance so much depends—has been found practicable in connexion with the L.N.E.R. and the Great Western. The practice of different gas undertakings varies, but for the most part gas undertakings are prepared to meet the railways very handsomely indeed in regard to maintenance. There are some very fine examples of gas lighted railway stations which are a good advertisement alike to the railways and the Gas Industry, besides being an obvious safety factor and convenience to the travelling public. On the other hand, and it is by no means necessarily the fault of the undertakings concerned, there exists much out-of-date gas lighting equipment which brings discredit to our Industry and to the railway companies themselves. Such equipment, incapable of yielding proper service, makes it very much easier for the electrical interests to advance their claims, and every endeavour should be made to persuade the authorities to substitute these obsolete fittings by modern gas lamps. On the question of charges made for gas, too, it must be remembered that electricity is being quoted for railway station lighting at very low rates. The competition is, to say the least, keen. But on stations there are large potential loads for gas for purposes other than lighting; and it is a field, we suggest, peculiarly well suited to the exploitation of two-part tariffs. If the railway authorities had extended to them attractive commodity prices, we feel sure that they would find it in their interest to make a far greater use of gas service than at present obtains. As we have said, considerable success has met the efforts put forward on a national basis, and a vast amount of useful data must have been accumulated. It remains for individual undertakings to leave no stone unturned in the attempt to transform unsatisfactory gas lighting installations where they exist into installations which reflect credit on our Industry.

In the Public Eye.

Of late years it has become quite the custom to permit organized bodies to tour gas-works, and the result has been beneficial to the Industry just to the extent to which interest in the uses of gas has been thereby stimulated. In some cases the amount of curiosity aroused, or of knowledge assimilated, from the point of view of the actual uses to which gas could be applied in the home and in industry, may be very slight. This, at any rate, is the opinion of those associated with the Rochdale Corporation Gas Department, whose Sales Manager, Mr. T. Smith, in a recent Paper, stated that steps have been taken to alter such a state of affairs. A display of apparatus is arranged in the Board Room at the Works, and at the close of the tour those taking part are invited to inspect this, and to listen to a talk on the improvements which have taken place in the construction of apparatus. Further, the visitors are encouraged to ask questions. Mr. Smith states that enquiries and subsequent business have been the result, so that it is evidently a sound policy for the Department. But we would commend it also from a more general viewpoint, as inducing a little more lively interest in municipal activities. This country's local government system is rightly the cause of envy in other parts of the world, but we feel sure that it would give even more general satisfaction if the ratepayers could be induced to take a more active interest in it. To say the least, it is an ill-reward for those who devote their energies and time to the work of Councils to be kept to a great extent in ignorance of the real wishes of the local ratepayers, and this in far too many cases is precisely the state in which they are kept. Is it doubted? Well, at a recent by-election in connexion with a London Borough Council no more than 13% of the electorate went to the poll. Is not this a case of a councillor being kept in ignorance of the real views of the ratepayers? We think so, and that is why we are out to welcome any move that is likely to increase public interest in the multifarious activities of local governing bodies. Rochdale offers an example of one move; we may hear of others.

Forthcoming Engagements

February.

10.—**B.C.G.A.**—Annual Meeting of Scottish Members, North British Station Hotel, Edinburgh, 2.30 p.m.
11.—**I.G.E.**—Gas-Works Safety Rules Committee, 2.30 p.m.
12.—**Scottish Western Juniors.**—Meeting and Paper by E. Smith, of Dumbarton, "Stores Control and Job Costing."
14.—**W.G.C.**—Executive Committee, Gas Industry House, 2.30 p.m.
15.—**I.G.E.**—Gas Education Executive Committee, 2.30 p.m.
15.—**W.G.C.**—Training Sub-Committee, 10.30 a.m.
15.—**London and Southern Juniors.**—Meeting and Paper by E. W. B. Dunning, of the Gas Light and Coke Company, "The Relation of Design to Cooking Quality."
15.—**B.C.G.A.**—Annual Meeting of Members in Yorkshire District, Leeds, 3.45 p.m.
17.—**S.B.G.I.**—Council Meeting at 56, Victoria Street, S.W. 1, 2.30 p.m.
17.—**B.C.G.A.**—Annual Meeting of Members in the Southern District, Gas Industry House, S.W. 1, 2.30 p.m.
18.—**Southern Association (Western District).**—Commercial Meeting, Rougemount Hotel, Exeter, 2.30 p.m.
19.—**Scottish Western Juniors.**—Annual Whist Drive and Dance.
21.—**London and Counties Coke Association.**—Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m. Both meetings at Gas Industry House.
21.—**L.C.C.A.**—Finance Committee, 10.45 a.m.; Executive Committee, 11.15 a.m.; Central Committee, 2.30 p.m.
22.—**B.C.G.A.**—Annual Meeting of Members in the Manchester District, Manchester, 3 p.m.
23.—**Southern Association (Eastern District).**—Meeting at Gas Industry House. Paper on "Observations on the Heating up of Silica Retort Settings."
24.—**B.C.G.A.**—Annual Meeting of Members in the Eastern District, Cambridge, 2.15 p.m.
26.—**Yorkshire Juniors.**—Meeting at Barnsley. Paper by I. Friedman, of Ascot Gas Water Heaters, Ltd.
26.—**Western Juniors.**—Visit to Bristol. Paper by A. B. Horsfield.

February 21-March 4.

British Industries Fair, Castle Bromwich.

Feb. 24.—Joint Visit of Junior Gas Associations.
Feb. 25.—Joint Visit of B.C.G.A. Salesmen's Circles.
Feb. 28.—Visit of Women's Gas Council.
Mar. 1-3.—Joint Gas Conference.

March.

3.—**Midland Juniors.**—Meeting and Paper by D. J. Ward on "M.A.N." Holder Tar Re-conditioning Plant."
4.—**I.G.E.**—Research Executive Committee, 2.30 p.m.
5.—**Scottish Juniors.**—Joint Meeting at Edinburgh. Paper by Col. W. Carmichael Peebles on "Governors."
5.—**Manchester and District Juniors and Yorkshire Juniors.**—Joint Visit to W. C. Holmes & Co., Ltd., Huddersfield. Paper by E. B Craddock on "Organizing an Industrial Gas Department at Stockport."
7.—**I.G.E.**—Finance Committee, 1.45 p.m.; Membership Committee, 2.15 p.m.; General Purposes Committee, 3 p.m.
8.—**I.G.E.**—Council, 10 a.m.
9.—**I.G.E.**—Board of Examiners, 10.30 a.m.
12.—**Scottish Juniors.**—Joint Visit to Works and Showrooms at Alloa.
15.—**I.G.E.**—Gas Education Executive Committee, 2.30 p.m.
15.—**London and Southern Juniors.**—Meeting and Paper by C. H. Ward on "Coke Conveyors."
17.—**I.G.E.**—Refractory Materials Joint Committee, 2.30 p.m.
19.—**Wales and Mon. Juniors.**—Visit to Neath.

Letters to the Editor

"Stresses in Spirally Guided Gasholders"

SIR,—Since writing the review of Mr. Milbourne's book with the above title, I have had an opportunity of verifying the reference made to the diameter of the model on page 22. It would appear that the lower section of the model represents the tank, and not the outer lift as might appear at first sight. This may explain why the diameter of the model is 80 mm. instead of 81 mm.

Unfortunately in my review there was a typing error in which these dimensions were referred to as "feet."

Yours, &c.,

GEO. EVETTS.

159, *Palace Chambers, S.W.* 1,
Feb. 7, 1938.

Salaries of Gas Engineers

SIR,—It is pleasing to note that those at the top of the tree, also The Institution of Gas Engineers, are once again championing the cause of their lesser paid brethren. It is about time something was done nationally to safeguard the interests of the Gas Industry.

It stands to reason that no self-respecting qualified man will apply for some of the positions advertised at the inadequate salaries offered, sometimes with the proviso "must be member of The Institution of Gas Engineers."

It is said that practice and practice alone leads to perfection. I disagree, as theoretical knowledge should be thoroughly mixed with practice and then perfection may possibly be in sight.

The big men of to-morrow should be the small men of to-day; therefore only the qualified should constitute the small men. But will the qualified accept the inadequate salaries offered to-day? I think not. They will find some specialized branch and stick to that.

Let me give some comparisons: 32 million works, £475 per annum; 48 million works, £400 per annum; 95 million works, £325 per annum. These three works are within a reasonable distance of each other in the North of England.

May I suggest a scale to work from as a minimum:

	Qualified.	Unqualified.
Up to 25 million per annum	£250	£200
„ 50 „ „	£300	£250
„ 75 „ „	£400	£350
„ 100 „ „	£450	should not be entertained.
„ 200 „ „	£500	

If something like this was laid down (similar to Civil Service salary scale) I am sure the unqualified would endeavour to become qualified via The Institution of Gas Engineers. Added to the foregoing figures I would suggest a further £100 per annum minimum for the man who takes over the duties of Secretary (which invariably include the duties of Treasurer and Registrar).

Yours, &c.,

Feb. 4, 1938. M. & S., Small Works.

Personal

Mr. A. COLLINSON has resigned from the position of Distribution Superintendent with the Darwen Gas Department.

* * *

Mr. T. F. SCOTT has been appointed to the position of Engineer and Manager of the Girvan (Ayrshire) Gas Company.

* * *

After 45 years' service with the Dumfries Gas Department, Mr. SAMUEL DICKIE, Engineer and Manager, retires on Feb. 15 through ill-health.

* * *

Mr. R. J. SMITH, Assistant General Manager of the National Benzole Company, Ltd., has been appointed General Manager. He has been with the Company since it was formed in 1919.

* * *

Mr. GARNET T. TEMBLETT, Manager and Secretary of the Andover Lighting and Power Company, has been appointed Managing Director after nearly forty years' service. This appointment coincides with the Centenary year of the Company.

* * *

Mr. C. DUNN, Assistant Engineer and Works Manager of the Wells (Somerset) Gas Light Company, has succeeded his brother, Mr. G. F. DUNN, in the position of Engineer, Manager, and Secretary of the Company. The latter retires after 21 years in charge of the Undertaking.

The position of Engineer and Manager of the Padiham Gas Department, which has been vacant since the death of Mr. H. B. Knowles, has been filled by the appointment of Mr. J. ROBERTS. The latter has been Engineer, Manager, and Secretary of the Ripon Corporation Gas Department for the past four years.

* * *

Major GEOFFREY H. KITSON, Chairman of the Leeds Gas Committee and a Past-President of the British Commercial Gas Association, has been elected to the Board of the London and North-Eastern Railway Company. Major Kitson's family has for long been associated with the Railway Company, he being the fourth generation to serve on the Board.

* * *

In succession to the late R. W. Edwards, Mr. T. A. BRADDOCK has been elected Chairman of the Reading Gas Company. The vacancy on the Board has been filled by the appointment of Mr. A. V. BARRACLOUGH (Chief Engineer to Associated Utilities, Ltd.), while Mr. D. H. HELPS, who has been Engineer and Manager of the Company for the past 35 years, has also joined the Board.

* * *

Mr. HERBERT LAWTON, Distribution Superintendent of the Hull Station of the British Gas Light Company, upon his retirement after forty-one years' service with the Company, twenty-six years of which were spent at the old Potteries Station of the Company, was the recipient of a very handsome silver tea service from the Chairman and Court of Directors.

Presentations were also made to him by the Staff of a wireless set and a case of three pipes, while the employees gave him a handsome cabinet of cutlery and a handbag for Mrs. Lawton.

* * *

Mr. WILLIAM STANFORD, Secretary of the Newport (Mon.) Gas Company, succeeded Sir Thomas Allen, J.P., as President of the Newport Chamber of Commerce on Jan. 28.

Proposing Mr. Stanford's election, Sir Thomas said that Mr. Stanford was wise in counsel, had a capacity for hard work, and as a result of many years' wide experience his judgment would be invaluable; he would enhance the office which had already been held by many eminent men.

In expressing his sincere thanks, Mr. Stanford said that in honouring him the Chamber was honouring the undertaking with which he had now been associated for over fifty years.

Obituary

We regret to record the death of Mrs. S. MOORE, wife of Mr. S. Moore, who was formerly Engineer and Manager of the Scunthorpe and Burnham-on-Sea Gas-Works, and is now a Director of the Underpressure Engineering Company, Ltd.

* * *

The death took place in a nursing home in Sheffield on Jan. 19 of Mr. REES JENKINS, M.B.E., who for the past fifteen years had been Chemical Engineer to the Sheffield Gas Company. He was fifty-one years of age, and leaves a widow and one son.

Mr. Jenkins received his training in engineering and chemistry both in England and in Germany. He had worked on various coke oven and by-product plants in England, and before taking up the appointment with the Sheffield Gas Company he had been in charge of the chemical works of the Coventry Gas Department.

During the war he held a commission in the Intelligence Corps.

Mr. Jenkins was a most interesting personality. He had travelled widely and was very well read as well as being a linguist of no mean ability. He was held in high esteem by his colleagues and all with whom he came in contact.

Cooking Competition for Schoolgirls

Prizes won in the recent 20th Annual Cookery Competition organized by York Gas Company for elementary school girls were presented by the Lady Mayoress (Mrs. C. T. Hutchinson) on Feb. 4.

Mr. H. E. Bloor (Director and Secretary of York Gas Company) said the winner of first place in these annual competitions secured for her school the right to hold a shield for one year. This time, for the second year in succession, a girl from Poppleton Road Senior School had won first prize. He congratulated the school on this honour, and hoped they would make a big effort to win again next year, and that all the other schools would do their best to stop them winning.

Prizes of cookery books were presented to other winners.

After a programme of country dances by the girls from Poppleton Road School, Mr. Bloor expressed thanks to the headmaster for the arrangements, to the Lady Mayoress and Sheriff's Lady, to Lady Grimthorpe (wife of the Chairman of the Gas Company) for her attendance, and to Miss Hampson, Superintendent of Domestic Science for the City.

News of the Week

The Gas Meter Company, Ltd., will be exhibiting on *Stand No. Ca.* 704 at the B.I.F., Birmingham. Their advertisements on p. 287 and the back cover of last week's "JOURNAL" stated incorrect stand numbers.

Gas Lighting and Radiant Heating are to be installed at Birchington Central School by the Westgate-on-Sea and Birchington Gas Company.

An Increase in the price charged to Clayton-le-Moors and Accrington Councils for lighting and maintaining street lamps as from July 1, 1938, has been intimated by the Accrington District Gas Board.

Ten Miles of Gas Piping are laid in the vast British Industries Fair building at Castle Bromwich, and the gas kitchens will provide a minimum of 12,500 meals each day during the course of the Fair.

For Showrooms and Demonstration Theatre, the Stockport Gas Department has approved expenditure on the conversion of premises in Gorton Road, Reddish. Tenders for the work are shortly to be invited.

Birkenhead Libraries Committee has decided that the heating apparatus at the Central Library be converted to gas firing for an experimental period of twelve months, and that, if it is satisfactory, it be adopted permanently.

On the Lines of the Assisted-Wiring Scheme of the Electricity Department, Mr. J. F. Simpson, Engineer and Manager of the Scunthorpe Gas Department, has received instructions to prepare a scheme, in conjunction with the Borough Treasurer, for the installation of gas in old property.

The Aurora Borealis, which so brilliantly illuminated our Northern skies on the night of Jan. 25, provided the Ramsgate Gas Department with "copy" for an advertisement in a local paper as follows: "Did you see the Northern Lights? Brilliance in the night sky is a phenomenon. Brilliance in the home is within the reach of all gas users."

An Article on the Barbados Gas Undertaking appeared in the Jan. 15 issue of the *Barbados Advocate*. Attention is drawn to the fact that the Company is the oldest of the island's non-governmental public utilities. Sixty-five years of varied experience, runs the article, finds this Company at its "Meridian," and with its present capable and energetic Manager, Mr. J. W. Brown, who has shared 25 years of its life, aided by a staff whose experience of the Company ranges from one to three decades, the public possesses an establishment which offers a wealth of service that can only be appreciated by a visit to the works and showrooms. We note in the same paper that Mr. Brown is displaying great versatility by running a radio column.

The Price of Gas at Warrington has been advanced by 4d., to 3s. 6d. per 1,000 cu.ft., for local domestic supplies. The increase of 4d. is entirely due to the increased cost of coal. Taking the average consumption of a domestic user, the increase to householders will not be more than 2d. per week.

A Hurried Search for Candles on Jan. 31 was occasioned when the electric current failed at Dunfermline between 5 and 6 p.m. In some parts the breakdown lasted about half-an-hour, while in other cases it was longer. Among the premises affected was the General Post Office, where, fortunately, candles were available. In a large garage car headlamps solved the problem. A terrific downpour of rain was endured by those who ventured out to purchase candles. The defect was caused by heavy rain damaging a transformer.

Exceptionally Large Audiences were a feature of each session when gas films were shown at Worcester. Three showings were given every day for a week; in the forenoon girls from elementary, secondary, and private schools attended, while the afternoon and evening sessions were reserved for adults. On three occasions a "House Full" sign had to be exhibited. Approximately 2,500 adults and 600 schoolgirls saw the films, which were universally appreciated. Mr. Therm brooches were given to each girl, and prizes are being offered for the best essay on the films submitted.

An Exhibition of gas appliances used in the catering trades, the first exhibition of its kind to be held in Inverness, opened in the Bank Street Hall on Jan. 31, under the auspices of the Inverness Gas Department. The exhibition, which continued until Feb. 5, embraced a large variety of appliances, including refrigerators, hotplates, coffee sets, vegetable steamers, tea boilers, grillers, and carving tables. Perhaps the most novel item on view was an automatic toaster, which cannot burn the bread, being equipped with a regulator which enables light brown, brown, or dark toast to be made at will.

Mr. Therm Made a Recent Appeal on behalf of solitary aged people at Tunbridge Wells. At the showrooms of the Tunbridge Wells Gas Company was shown a model of one of the delightful homes to be erected by the Council of Service at Hawkenbury, in which gas equipment will greatly aid those who have become less active owing to advancing years. Mr. Therm, speaking into a dummy microphone, asked for subscriptions towards the cost of providing these homes. "John" and "Mary," a typical couple who will benefit under the Council of Service scheme, joined Mr. Therm and many members of the public in the showrooms on two occasions. The gas equipment in these homes will include a Main "Tiney" cooker, iron, water heater, and gas-ignited coke fire.

Yorkshire Industrial Gas Development Centre

At the Annual Meeting of the Industrial Gas Development Committee of the Yorkshire Centre held on Wednesday, Jan. 26, Mr. C. S. Shapley, Engineer and General Manager of the City of Leeds Gas Department, was re-elected Chairman. He had expressed the desire to relinquish the chairmanship, as he felt that this honour should be passed round among the members. The Committee, while thoroughly appreciating the sentiments which prompted Mr. Shapley to take this step, felt that he was essentially the man for the position and asked him to continue in the Chair. Mr. Shapley thanked the members for their kind remarks and agreed to continue for a further year.

The Annual Report stated that the year 1937 had been one of steady progress for the Centre. Although there had been two amalgamations with other companies the membership of the Centre had increased to 58. The following table shows the total annual sales of the gas undertakings comprising the Centre's area, the sales by members and its percentage of the total.

—	1935.	1936.	1937.
Total sales by all undertakings (million cu.ft.)	33,457	35,524	37,344
Total sales by members (million cu.ft.) ..	29,533	31,697	34,443
Percentage of members' sales to total ..	88·28	89·23	92·23

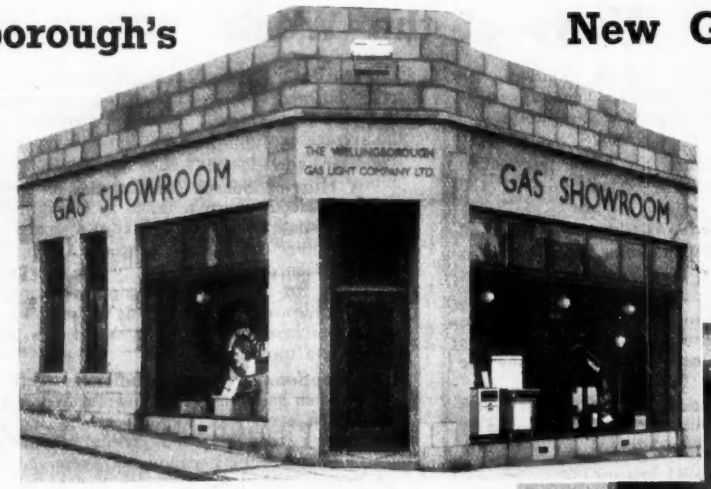
It was reported that the number of enquiries dealt with during the year had shown a steady increase and that there were not the same grounds for complaint in this respect as previously. It was felt, however, that the Centre could be of assistance in many cases where it had not been called upon.

The Report pointed out that in some cases enquiries for information or assistance were of a somewhat vague nature, and that it would be in the interests of all concerned if a more thorough investigation of the requirements were to be made and all the ascertainable data submitted to the Centre. New business must in the first instance be evolved by the members themselves, although the Centre could give advice relative to the processes for which gas might be utilized in any particular trade or industry.

The Report commented on the utility of the reports sent out by the Industrial Gas Centres from time to time, as witnessed by the number of enquiries that had been received concerning them. Comment was made regarding the prices charged for industrial gas business, and it was stated that there was every reason to believe that considerable efforts had been and are being made to reduce prices to as low a limit as possible.

The work of the Technical Sub-Committee of the Centre was discussed, and appreciation was expressed of the good work that it was doing and of the assistance which the representatives of the member undertakings attending obtained from it. The proceedings of the meetings of the Industrial Gas Centres Committee were also reviewed and decisions taken upon various subjects arising therefrom.

Irthlingborough's New Gas Showrooms



New showrooms erected by the Wellingborough Gas Light Company at Irthlingborough were opened on Jan. 7 by Mr. W. Langley, J.P., C.C., Chairman of the Irthlingborough Urban District Council, in the presence of members of the Irthlingborough Council and Directors of the Company.

The new premises not only afford greatly improved showroom accommodation, but will serve as a centre for the Irthlingborough business, in place of the old gas-works, which were closed down after the amalgamation of the local Company with Wellingborough in 1936.

The building consists of a single storey block situated on a corner site in the main street, comprising showroom, office, stores, and fitters' shop. It also includes a lock-up shop, the area of the available site being larger than the Company required. The buildings are constructed of steel and brickwork, with facings of synthetic Weldon stone on the main frontages. The interior fittings have been carried out in oak, and a section has been provided for the demonstration of gas water heating apparatus, gas fires, and other appliances which may be seen under working conditions.

The building was designed by Mr. C. C. Wood, the Engineer to the Wellingborough Gas Light Company, in consultation with Mr. W. Gaskin, of the B.C.G.A. Messrs. W. Thompson & Sons, Ltd., of Irthlingborough, were the principal contractors for the erection. The shop fronts, fascia inscriptions, &c., were carried out by Messrs. G. Parnell & Co., of 4, Bedford Square, W.C. 1.

Protection of Iron and Steel from Corrosion

[Contributed]

The physical effects of corrosion upon structural steelwork and their influence in the design and maintenance of certain types of machinery and plant are problems of vital interest to the constructural engineer and to the maintenance chief. For each the question is "how can corrosion be avoided?"

In order to preserve ordinary iron and steel from corrosion, some form of protective coating must be adopted. The life of paint is limited, as owing to the expansion and contraction of the coating under temperature variations cracks make their appearance, with the result that corrosive agencies gain entrance and it is no uncommon experience to find that these coatings drop off, carrying with them a substantial layer of rust.

It has been found that the most effective and economical method of protecting iron and steel from corrosive influences is by a coating of zinc—*i.e.*, galvanizing. The term "galvanizing" is usually understood to apply to the "hot" galvanizing process, in which the articles to be treated undergo a preliminary pickling in hydrochloric acid to remove scale and after washing in water are immersed in a bath of molten zinc. This process is totally distinct from the electro-galvanic method, in which a coating of zinc is obtained by electro deposition. This coating is comparatively thin; it is generally employed for the protection of smaller articles, and is especially suitable for bolts, nuts, screws, &c., where zinc would be likely to collect in the threads if galvanized by the "hot" process.

Hot galvanizing is recommended wherever possible because this process gives an even, substantial, and homogeneous coating, which completely prevents the access of air and moisture to the basis metal. This galvanized surface after a short exposure to the atmosphere becomes coated with an extremely dense and insoluble deposit of zinc oxide and basic carbonate which protects the underlying zinc from further atmospheric action. The weather-resisting property of the hot galvanized coating constitutes one of its most important advantages.

The zinc coating becomes definitely alloyed with the surface of the iron, and it is interesting to know that this coating is composite in character and really consists of several layers, merging one into the other so that there is no really sharp boundary between the iron surface underneath and the pure zinc above. The hot galvanizing process is, therefore, recognized as the most durable and weather-resisting method of protecting iron and steel from corrosion, as well as the most economical.

Investigations on Colour of Light

Work of the D.S.I.R.

Among the investigations being carried out under the auspices of the Department of Scientific and Industrial Research is one on the colour of light best suited for street illumination. Reference to this is made in the Department's Report for 1936-37 which has just been published (H.M. Stationery Office, price 3s. net).

The problem is, the report states, to distinguish rapidly and with certainty objects of various sizes and shapes which may appear suddenly on the surface of a lighted street. The method employed is to take a number of "still" photographs of a street, with and without different objects placed on the road surface. A film is then made of these photographs and this film is projected on to a screen in which are small holes at the places where the images of the street lights would appear. Behind these holes are placed lamps, giving light of the same colour as that used for projecting the picture, to represent the street lamps; in this way it is possible to get sources sufficiently bright to simulate on the screen the appearance of an actual lighted street. By careful control in the making of the photographs and the film, it is possible to reproduce closely the actual street scene in all the details affecting an observer's ability to pick out objects in the street which appear and disappear during the course of the film.

In connexion with the work of the Road Research Laboratory it is necessary to know, in studying the durability of road carpets, not only how many tons of traffic have passed over the road but how many tons have passed over when the road was wet and how many when it was dry. To determine this an instrument, known as a wet road clock, has been developed, which records the periods during which the road is wet. The instrument depends on the difference in the electrical resistance of a wet and a dry surface. Contact strips have been laid on the surface of the Colnbrook By-pass close to the Laboratory, and the signals given when the traffic passes over these are recorded on an instrument in the entrance hall of the Laboratory.

The Building Research Station is now taking up the problem of ventilation of buildings, and methods and instruments have been developed which will be first used in carrying out ventilation surveys in existing buildings. The extend to which a wall admits or excludes heat, and therefore its effect upon the amount of heat required to keep the room warm, is being investigated, for different types of wall, in six chambers of 8 ft. cube placed side by side with one wall of each facing north. Tests are being made first with three 9 in. solid walls and three cavity walls, all of Fletton bricks arranged alternately.

Extensions at Neath Gas-Works

Increased Industrial Demands

Extensions and improvements are now being made at the Gas-Works of the Neath Corporation—the result of increasing industrial demand for gaseous fuel and testimony to the energetic development policy adopted by Mr. W. Clark Jackson, Engineer and Manager to the Gas Department. The construction of an extension to the vertical retorts is in progress. This comprises six Woodall-Duckham upwardly heated vertical retorts complete with waste heat boiler; and the first section of a new automatically operated carburetted water gas plant which is in course of erection by Messrs. Humphreys & Glasgow, Ltd., is now in operation. The Metal Box Factory at Neath is using gas for the whole of its furnace heating and eventually will require 140 million cu.ft. per annum, which, incidentally, is 50% more than the total output of the Gas Department when Mr. Jackson was appointed Manager in 1915. In addition to the industrial demand, the domestic business is increasing in all directions, and the capacity of the works will shortly be raised from 1 million to 1½ million cu.ft. per day.

The New Water Gas Plant

The new carburetted water gas plant now in course of construction is the first of its kind in South Wales. It comprises two sections each having the capacity of 750,000 cu.ft. of 500 B.Th.U. gas in 24 hours; as we have mentioned, one section has been completed and is in routine operation.

The plant is of the makers' latest design and incorporates automatic operation, the back-run process, as well as automatically controlled secondary combustion.

The automatic operating system is of the mechanical type in which the power required for the movement of the various working valves is transmitted directly from the driving motor. For plant of this size and type this system presents a number of advantages over those incorporating hydraulic power.

The automatic operator is arranged so that the automatic movements of the working valves are readily adjusted to suit any particular fuel or manufacturing conditions; this adjustment is effected by the cams provided. When raising heats or in the event of failure of the electric power supply, the plant can be worked by hand by means of the hand levers provided.

A safety system of valve interlocking gear positively prevents the movement of any of the valves in an unsafe or incorrect sequence. This applies whether the plant is being operated automatically or by hand, and in the event of any irregularity in operation occurring, the attendant is warned immediately by means of a hooter. A bell also is provided and is sounded when the generator requires to be charged.

The system of automatically controlled secondary combustion is one of the most recent refinements applied to water gas operation. It ensures that the supply of secondary air is correctly proportioned to the varying quantity of combustible in the blast gases leaving the generator, and thus facilitates the maintenance of the most suitable temperatures in the fixing vessels and effects a marked saving in generator fuel consumption.

The installation includes a spiral water-tube gas condenser which, while maintaining the high efficiency of the horizontal multi-pass tube type, also retains the advantages of the simpler vertical tube condenser in so far as the tubes may be cleaned while the condenser is in operation.

The blowing plant comprises two steam turbine blowers of the latest type, and either of these machines is of ample capacity to serve two sections of generating plant when working together. The turbine blowers are located in the machinery room which also houses a new National twin-cylinder high speed gas-engine electric generating set, which provides current for the automatic operators of the C.W.G. plant as well as for other purposes.

Coke is delivered to the plant by a Humphreys-Glasgow safety steam cylinder coke hoist which is arranged with a swinging jib serving both sections of plant. The coke skip, which is filled at ground level, is mounted on a separate chassis and arranged so that the skip is elevated to a position above either generator, and the contents discharged without the necessity of landing this skip on the charging floor.

Municipal World Year Book*

For size the 1938 edition of the "Municipal Year Book and Encyclopædia of Local Government Administration" constitutes a record since this standard volume was founded in 1897. It comprises 1,712 pages, 32 more than last year, embraced in fifty sections, 41 of which are devoted to the most important branches of the administration, and the remaining nine sections the descriptive records of local authorities and the names and addresses of members of Councils and Chief Officers in the different classifications of Authorities in England, Wales, Scotland, and Eire; and also lists of Joint Authorities.

There is a comprehensive survey of local government developments in 1937, followed by a review of all the principal law cases of that year affecting local government, and details of the chief legislation of the last Parliamentary session. This year the Roads and Transport Section has been extended and includes a new feature giving details of the personnel, &c., of Highway Committees. Among other new features are the lists of Education Committees, with similar data relating to personnel. Other prominent sections include those relating to Housing, Town and Country Planning, Public Health Services, Parks and Open Spaces, Sewage Disposal, Public Cleansing Service, Fire Brigade Services, Water Supply, and Land Drainage. Many of the data and statistics are of especial importance this year because of the national attention focused on certain services; for instance, the Public Health Services, Street Lighting, Fire Brigade Services, and Water Supply.

Sir Kingsley Wood, M.P., Minister of Health, contributes the general preface to the volume, while the Minister of Transport writes a Foreword to the Roads and Transport Section. The new volume has been completely revised, fully 80% being rewritten.

* The Municipal Year Book and Encyclopædia of Local Government Administration. The Municipal Journal, Ltd., 3 and 4, Clement's Inn, Strand, London, W.C. 2; 30s. net.

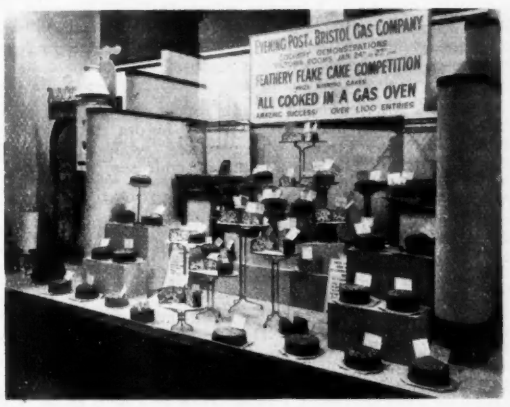
The Bulk Supply from Loughborough to Quorn and Mountsorrel was inaugurated recently in the presence of members of Loughborough Gas and Electricity Committees when the Mayor of Loughborough, Alderman Arthur Lacey, opened the valve at the Gas-Works. The scheme for supplying Loughborough gas to these two villages is now in full operation, after two years of negotiations.

Cookery Lectures at Bristol

Over 1,100 Entries for Cake Competition

In conjunction with the *Bristol Evening Post*, the Bristol Gas Company recently organized a series of Cookery Lectures at the Victoria Rooms, Bristol.

The Lecturer was Miss E. Crump, of London (Domestic Science Diploma, Board of Education), and the attendance during the four days was over 4,000.



Mr. George H. Boucher (Chairman of the Bristol Gas Company) performed the opening ceremony, supported by representatives of the *Evening Post*, the Victoria Flour Company, Ltd., and the Australian Fruit Growers.

A district Cake Competition was organized by all the above-mentioned firms, for which there was a record entry of 1,153. Over £40 was offered in prizes, and the competition created considerable interest. The winning cakes were exhibited in the Gas Company's showroom windows.

The Sales Staff and Home Service Section of the Company utilized the opportunity afforded by the Lectures to promote the interests of the Gas Industry among the thousands of women who attended, and it proved a valuable field for propaganda.

South Metropolitan Company's Accounts

Cumulative Rise in Cost of Labour and Materials

With the help of the revenue from coke and other by-products, the Directors of the South Metropolitan Gas Company were able to defer until the beginning of this year any change in the price of gas, but the cumulative rise in the costs of labour and materials then necessitated an increase of 0·4d. per therm. This plain and straightforward statement is extracted from the report of the Directors which will be submitted at the Annual Meeting of stockholders to-day, and it prefaces figures amplifying the reasons for the course that has been adopted. A year ago the ordinary dividend was reduced by ¼% to 5½%, which dividend it is recommended shall be maintained in respect of the past twelve months, the Directors saying that, after providing for debenture interest and dividends on the preference stocks, the balance of profit of £214,747 allows of a final dividend on the ordinary stock of 3%. The voluntary payment of an additional 1s. a ton on coal delivered under existing contracts has been continued throughout 1937, but the Board point out that the outlook for purchasers of coal must remain unsatisfactory until they are reasonably assured of adequate safeguards against undue increases of price or restriction of choice.

The assistance that has been rendered by by-products in lessening the effect upon the accounts of the cumulative rises already referred to will be evident from the following table; but even so the total receipts on revenue account fell a trifle short of those for the year 1936. The main reason for this lies in the fact that, as stated in the report, the quantity of gas sold in 1937—79,489,957 therms—was 3·84% less than that sold in 1936. The comparative table included in the accounts shows the decrease to have arisen under the heading of "Private lights (per meter)"—the quantity charged for "Public lights (estimated)" being satisfactorily up on the present occasion. Though, however, the figure of consumption per consumer has thus tended to be very slightly down, the basis of business has been widened, as there are now 441,975 consumers on the Company's books, which is the largest number in the history of the Undertaking; while the sales of appliances installed on hire-purchase during the year were greater by 72% than during the preceding twelve months. At the same time, sales of gas for industry have made further progress.

Residual Receipts.

	1937.	1936.
	£	£
Coke	641,993	582,046
Breeze	4,809	10,297
Tar, &c.	145,018	142,522
Ammonia, &c.	24,977	16,773
Total	£816,797	£751,638

Stockholders are reminded in the report that "the Company appeared by Counsel and gave evidence before the Joint Select Committee on Gas Prices, whose report, while criticizing the tariff introduced in 1936, was a complete endorsement of the basic price and dividend system."

From the personal point of view, the Directors' statement contains references which will be received with mixed feelings—regret on the score that Dr. Charles Carpenter, on medical advice, resigned the Presidency last March (though happily retaining his seat on the Board), and that some weeks before that date the death occurred of Mr. Frank Bush, Secretary of the Company from 1882 to 1908, and a Director from then until his life's end; pleasure in the knowledge that Dr. Carpenter has been succeeded in the Presidency by one so eminent in the gas profession as Mr. Frank H. Jones, and that another stalwart in Mr. A. M. Paddon is Vice-President. Mr. Harold Murphy, K.C., is the new Director.

One more point of interest in the report. The Company's Co-partnership is close upon its jubilee, and it is gratifying to have the Directors' declaration in this, the 49th year of the operation of the system, that its value "has once again been proved in the spirit displayed by all grades of employees."

The Accounts.

Turning now to the accounts, it is seen that there was capital expenditure during the year of £64,468 on high and low pressure mains and columns. The corresponding figure for 1936 was £99,220. On balance, the net capital expenditure was increased by £50,000 during the past twelve months. No capital has been received since the end of 1936, when there was a balance unspent of £4,370.

The rise or fall in the main items on Revenue Account will be noted in the accompanying table.

RECEIPTS.

	1937.	1936.
	£	£
Gas	2,672,544	2,736,322
Rentals of meters, stoves, and fittings	438,900	445,937
By-Products	816,797	751,638
Rents and transfer fees	8,110	7,146
Total	£3,936,351	£3,941,042

EXPENDITURE.

	1937.	1936.
	£	£
Manufacture of gas	1,884,034	1,885,630
Distribution	974,330	1,001,292
Public lamps, labour, and materials	30,143	15,678
Co-partnership fund	33,549	33,549
Rents, rates, and taxes	116,795	121,867
Management	186,188	194,963
Miscellaneous	151,063	178,135
Total expenditure	£3,376,102	£3,431,114
Balance to net revenue	£560,249	£509,928

From these figures it will be seen that, though the net revenue shows an increase of £50,321 over the balance of the previous year, the gross cost of gas manufacture was very much the same as in 1936, in spite of the fact that the quantity sold in 1937 was 3·84% less, and that £63,800 less was received for it. As already remarked, on the present occasion by-products make a much better showing, and bring up the revenue receipts very nearly to last year's figure. Apart from manufacture of gas, most of the other expenditure items are down, and in these accounts nothing is taken from the Special Purposes Fund, which was drawn upon to the extent of £30,000 a year ago, to meet "abnormal and unforeseeable expenses."

The balance-sheet shows cash at bankers and in hand £54,313, stores in hand £741,859, accounts due to Company £678,820, and the following balances outstanding: South Suburban Gas Company, £19,192; hire-purchase fittings, £492,670. These items, and the fact that the Capital Account is over-spent by £45,540, have necessitated a temporary loan from bankers of £670,000.

The amounts standing to the credit of the various funds at the end of the year were: Reserve Fund, £322,095; Renewal Fund, £170,845; Special Purposes Fund, £135,181; and Steamers' Accident Contingency Fund, £15,910—total, £644,031. Sundry creditors figure at £339,530, while Co-partnership and Superannuation and Co-partnership Insurance Funds account for £637,404.

It may be remarked that the amount due under hire-purchase agreements, which in the present accounts is £492,670, stood a year ago at £306,506—another striking illustration of the conditions under which an undertaking like the South Metropolitan Gas Company finds it necessary to operate to-day.

Gas Made and Sold.

	1937.	1936.
	Therms.	Therms.
Quantity made and bought	80,865,052	83,560,938
Quantity charged	77,144,636	80,136,935
Correction for temperature and pressure	2,345,321	2,526,562
Total sold	79,489,957	82,663,497
Used on works	1,387,361	1,406,667
Quantity accounted for	80,877,318	84,070,164
Balance	12,266	509,226

The quantity of gas made and bought includes 59,800 therms purchased from H.M. Fuel Research Station, while the quantity charged includes 2,950,294 therms sold to the South Suburban Gas Company.

Development of Coke Markets

Problems Facing Colliery Oven Coke

We reprint with permission this specially contributed article published in the Jan. 21 issue of the *Iron and Coal Trades Review.*

The progress of events which has characterized 1937 as an important year for oven-coke producers will, very largely, continue to influence the future development and prosperity of the coke industry as a whole. The impetus which has been given to the production of coke by the requirements of the steel industry since 1934 has been fundamentally responsible for bringing the coke-oven industry to the strong position it now enjoys, in both the home and export markets. This impetus was badly needed and 1937 has probably seen the culmination of three years' activity in the installation of new coke ovens—an activity unprecedented in the history of the industry. Its total productive capacity has in that time been increased by nearly 50%, and its existing plant has been rehabilitated in a very marked degree.

It is, however, significant that the constructional measures taken by the steel industry to ensure self-sufficiency in respect of coke supplies have resulted in the installation at steelworks of a coke productive capacity nearly double that at colliery coke ovens within the same period.

This development must be recognized as a process of rational integration providing for commercial stability and for greater efficiency in steel production; but it will have the effect of directing colliery oven coke increasingly to other markets, not necessarily as a consequence of any diminution in the coke requirements of the steel industry, but because the industry is placing itself in a progressively better position to provide for its own coke requirements.

At the same time, there is concrete evidence of a determination in the colliery coke-oven industry to build up the commercial side of its business. It has been recognized that the trend of the industry's trading policy must be increasingly towards the general markets of the country, and 1937 has shown more progress in the co-ordination of its interests and has produced more evidence of active co-operation among its units than hitherto achieved.

In the Yorkshire area, more than 80% of the oven coke producers have formed themselves into a Coke Producers' Federation; Yorkshire and Durham have established a Coke Co-ordination Committee; the Notts and Derby coke-oven owners have also formed themselves into an Association, and on the North-East Coast the coke producers have associated into one body with the gas-coke producers. From these examples it is evident that the colliery coke-oven producers are taking a much closer interest and are preparing to trade in the general home markets to a greater degree than they have contemplated in the past.

Surplus Coking Capacity.

The total productive capacity of coke-oven coke from all sources indicates a surplus production in 1938 over all present market demands of 4 million tons, increasing, as new plant comes into operation, to a maximum of probably 7 million tons in 1939. The demands of the steel industry during the next two years will, therefore, largely influence the general level of coke markets, and a reduction in the steel demand would necessarily make a large surplus of coke available for general consumption. The trend, however, is in the direction of increased steel output, even beyond the 12,900,000 tons achieved in 1937. Pre-supposing that increased consumption continues in the steel industry, there will yet remain a considerable and growing surplus of coke-oven coke which will require to be absorbed into general markets, and it is evident that a wise policy would seek to make provision for this absorption with the least possible disturbance in the balance of existing markets.

It seems clear, therefore, that any move to a closer co-ordination of interests within the industry is a wise one, but in itself is not sufficient to maintain an economic balance of markets. In addition, there must be a closer alliance with the Gas Industry, which operates primarily in these same general markets in which surplus coke-oven coke would have to be absorbed.

Coke-oven coke has, of course, for many years been sold largely in domestic and general markets; but recently to meet the increased demands of the steel industry, general markets have suffered from the withdrawal of oven-coke supplies. A market, once denuded and thereby lost, is probably more difficult to regain than it was to build up originally, so that it cannot be assumed that general markets will readily absorb even the same quantity of coke-oven coke which they did originally.

The moves which have been made during 1937 towards wider co-operative working should, therefore, not only be continued, but should advisedly be expedited: it would be a wise and proper policy to commence preparation for increased absorption of coke into general markets at this time, rather than to wait until a reduction in the demand of the steel industry takes place.

Many hard lessons have been learned in the coke-oven industry, and if 1937 has taught anything it should be that the old era of price-cutting represented unsound administration. There is no statutory control in the coke trade, but its growth and importance may determine that such control is necessary in the same way as it is necessary for coal, unless organization of a really practical character from within the industry itself is achieved.

With regard to export, the International Cartel has come into full operation during 1937, so that this development has placed defined limits on export quotas, and, further, it has illustrated the necessity for co-ordinating selling conditions within the industry as a whole. The Cartel has operated adequately, and so far satisfactorily enough to indicate the desirability of international agreement. Its testing time, however, is yet to come, and its value will probably show itself in greater measure under depressed market conditions.

Sales of Gas Coke.

With regard to coke sales and development within the Gas Industry, 1937 has been a good year, and 850,000 more tons of coke have been made available for sale than in the previous year.

The domestic market for coke is increasing steadily and continuously, and there have not been adequate supplies to meet the demand for all areas during this last year. In the domestic market the Gas Industry now sells over 60% of its product; it has, of course, cultivated the domestic trade; and has achieved a large measure of stability in that market. It has, also, largely co-ordinated its selling policy and development and has placed its coke trading on a progressively sound basis.

Regional Coke Associations within the Gas Industry are in operation in different parts of the country and are generally promoting the sustained progress of the domestic market. At the same time a definite policy of expansion is being followed and new coke markets explored. New and improved appliances for the more efficient utilization of the fuel are being developed and generally the position of coke is being strengthened in many directions. Market and trade surveys are undertaken, together with a study of the quality and characteristics of coke for certain specific purposes.

These points are outlined not because they are new to the policy of gas-coke marketing, but because they convey some indication of achievement through the operation of a co-operative policy. On the other hand, the coke-oven industry may congratulate itself on the fact that in the short space of four years it has raised its productive capacity to a position in which it can provide for the full requirements of the markets it serves, and that it has, or will have, in addition, a substantial surplus.

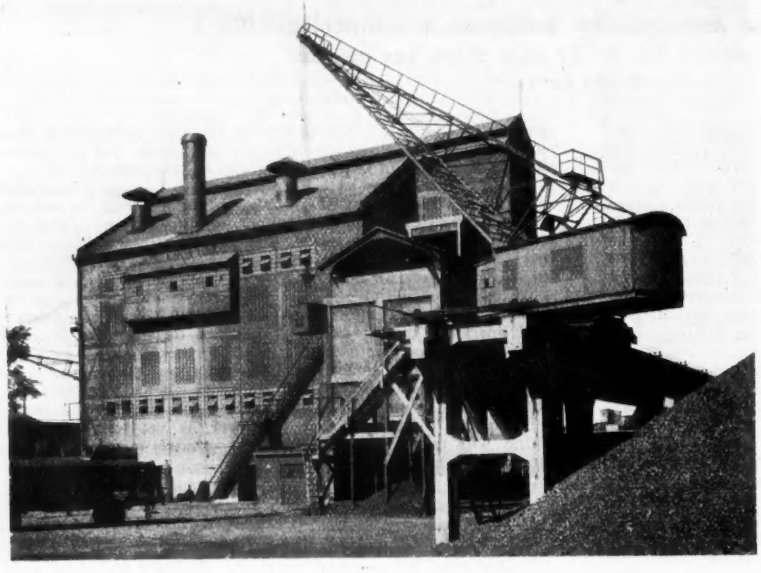
If it is conceded that market development is a necessary and serious consideration for the future wellbeing of the colliery coke-oven industry, then something more than price stabilization must be envisaged. The industry must recognize the economic forces which are slowly but surely driving it to seek other markets than the steel industry for the absorption of its product. It is certain, too, that the industry will not be content, and neither can it afford, to fall back on its old system of indiscriminate selling in general markets. Price stabilization is of inestimable value, but it is only a beginning and is not in itself sufficient to ensure the effective sale of a product at an economic price to the producer.

The industry, through the medium of its Associations, must envisage a wider policy of development; it will require to promote the extension and maintenance of its markets; the more effective utilization of its product in the markets in which it is sold, and the provision of a proper product for the specific purposes for which it is to be used. If firm markets are to be achieved, then co-ordinated effort is necessary, and the industry must itself understand in a direct and familiar way the requirements of these markets.

The industry cannot afford to follow in the future the same haphazard method of distribution and selling of its product into general inland markets which brought it to the verge of collapse in the past. There is no coke selling problem at the moment, but there are clear indications that many problems will present themselves at no distant date. The outlook does not justify complacency, but demands action.

Reconstruction of Glover-West Verticals at Warsaw

In the following extract from the January number of *West's Gas* we describe the reconstruction of the Glover-West vertical retort bench at Poland's capital city after nearly seven years' continuous service.



The Retort House at Warsaw.

In 1925 the Warsaw Gas-Works passed into the hands of the Warsaw Municipality, and from this date considerable investments were made by the Municipality in order to bring the carbonizing units, auxiliary plant, and other equipment to an up-to-date standard of efficiency.

The Director-in-Chief of the Warsaw Municipal Gas-Works is the eminent Polish chemist and fuel technologist, Dr. Inz. B. Roga. It is interesting to note that the research work carried out by Dr. Roga and his staff in that important subject, the detoxification of town gas, has been rewarded with success. Exhaustive tests carried out on a small scale plant erected in the Wola Gas-Works, capable of "detoxifying" from 2,000 to 2,500 m³ of gas per 24 hours, prove that the CO content can be reduced from 17% to 1% and in some cases as low as 0·8%. In view of the success of this investigation, the building of a full-size plant for the detoxification of the whole of the gas for the requirements of Warsaw is now contemplated.

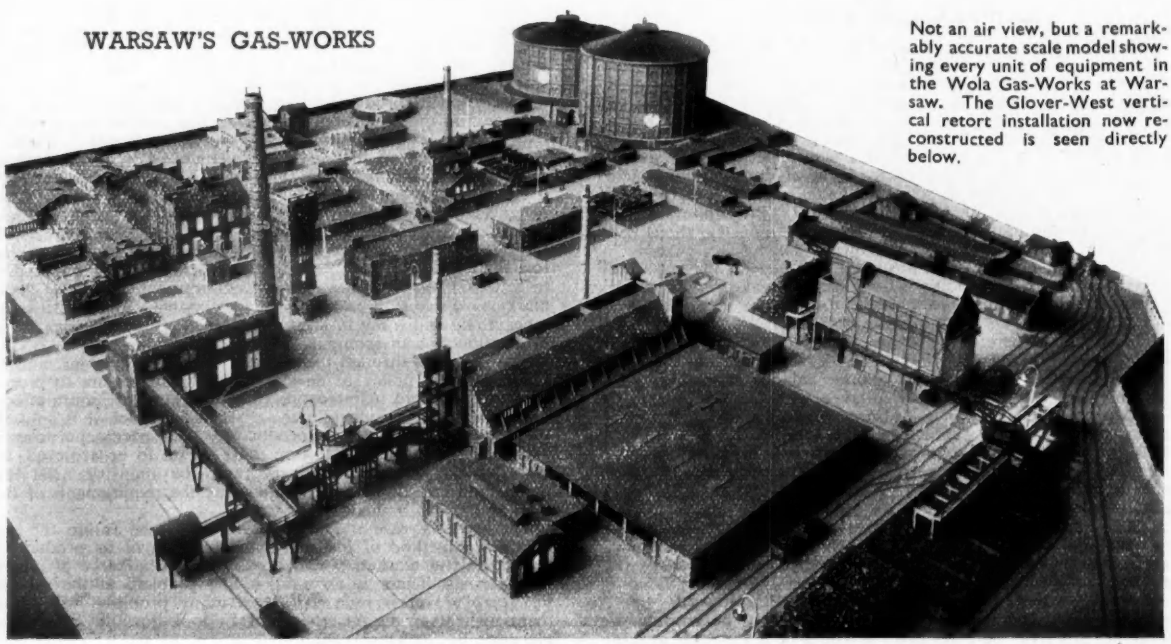
Carbonizing Plant.

The last extension to the carbonizing plant at the Warsaw Municipal Gas-Works put into operation on April 2, 1930, consisted of an installation of 48 Glover-West continuous vertical retorts arranged in six settings, each of eight retorts, complete with modern coal and coke-handling plants and boiler plant for the recovery of surplus heat.

The nominal capacity of the carbonizing installation was 120,000 m³ of gas per 24 hours (4,200,000 cu.ft.) at a calorific value of 4,100 kg.-cal. per m³ (430 B.Th.U. per cu.ft.) when carbonizing approximately 200 tonnes of Polish Upper Silesian coal. The retort bench was of the standard Glover-West design. The New Model retorts (40 in. by 10 in. by 25 ft. long) were arranged in units of four, each setting of eight retorts being supplied with fuel gas from a built-in step-grate producer. Two retorts, which could be completely isolated from the other carbonizing units, were specially arranged for test purposes, having separate coal-storage bunkers, and gas and tar mains connected direct to a complete large-scale test plant.

The waste-heat recovery plant comprised two horizontal, induced-draught, fire-tube boilers of the standard Spencer-Bonecourt design, each capable of dealing with the waste gases from the whole six settings, and of raising normally 5,750 kg. (12,675 lb.) of steam per hour, from and at 100° C. These boilers

WARSAW'S GAS-WORKS



Not an air view, but a remarkably accurate scale model showing every unit of equipment in the Wola Gas-Works at Warsaw. The Glover-West vertical retort installation now reconstructed is seen directly below.

supplied steam to the retorts, to the 40 h.p. Sisson steam engine driving the induced-draught fans, and to all the pumps in the retort house, with a substantial surplus for general works purposes.

Coal and Coke Handling Plant.

Coal was brought to the retort house in railway wagons by the works locomotives, the contents of the wagons being discharged into a large receiving hopper. The coal was fed mechanically from the receiving hopper into one of two breakers of the West four-roll type. The broken coal was conveyed, elevated, and distributed to the coal-storage bunkers situated above the retorts by West lip-bucket conveyors.

Coke was discharged from the retorts into one of the lip-bucket conveyors in the usual manner, and was delivered to the coke-screening plant, the unscreened-coke hopper, or the producer and retort-feed hoppers. The screened-coke storage hoppers, of 36 hours' capacity, were constructed of reinforced concrete, with three compartments for receiving the following sizes of coke from the coke graders: 0-20 mm. (0-¾ in.), 20-40 mm. (¾-1½ in.), and over 40 mm. (over 1½ in.). The hoppers were equipped with outlets and chutes for the filling of railway wagons and road vehicles. The unscreened-coke hopper, with a capacity of 24 hours' make of coke, was fitted with a West automatic skip filler for the service of the crane.

The Glover-West installation described above had been in continuous operation since 1930, without any portion of the carbonizing units having been cooled down for major repairs. The entire plant had worked very efficiently and had given excellent carbonizing results for more than six years. Towards the end of 1936, however, it was evident that attention would have to be directed towards the question of re-setting the retorts, as they were considered to have exceeded their useful working life by that time, having been uninterruptedly in operation for 2,400 days. (Before the last setting was put out of operation in June, 1937, the retorts had worked for the remarkably long period of 2,615 days.) The contract for the reconstruction of the Glover-West retort bench was, therefore, entrusted to West's Gas Improvement Company at the end of 1936, to enable work to be commenced early in 1937.

Building Programme.

The complete reconstruction of this installation presented an important and somewhat difficult problem to the Warsaw Gas Department. In the first place, due to the limited amount of reserve carbonizing plant which could be brought into operation with safety, coupled with the increasing demands for gas, it became evident that the rebuilding of the settings could only take place at certain periods of the year. In fact, only for a period of six weeks during the holiday months of July and August, when the sale of gas reached its lowest level, would it be possible for the Glover-West installation to be entirely out of operation. Secondly, the increased number of skilled operatives required for the reserve carbonizing units, and the corresponding excessive working costs of this old type of intermittent plant, demanded that the rebuilding of the settings should be carried out in the shortest time possible.

The foregoing points necessitated a very careful study of the situation, and in collaboration with the Engineers of the Wola Gas-Works, a detailed building programme was drawn up by the Continental staff of West's Gas Improvement Company, which allowed for the work to be carried out in successive stages. The cooling down of the first two settings was scheduled to take place on Feb. 27, 1937, the remaining four settings to be shut down, one at a time, during the months of March, May, June, and July. The first two settings were to be ready for gas-making not later than Aug. 14, followed by the other settings in September, November, and December, the last of the reconstructed settings to be put into operation not later than Dec. 11, 1937, thus taking in all a period of 41 weeks from the shutting down of the first setting to gas-making on the last of the reconstructed settings. Full allowance had been made in the building programme for the time necessary for the cooling down of the setting-brickwork, removal and dismantling of retort fittings, demolition of refractory brickwork, repairs and renewals to the retort fittings and subsequent erection of the new settings and of the fittings, and for the drying out of the retort bench brickwork.

Improvements in Design of Settings.

When the existing Glover-West installation was originally built in 1930 it was one of the most modern of carbonizing plants. Since that time, as is well known, many notable and important advances have been made in the design and construction of the various parts of the Glover-West setting, and it was decided to incorporate most of these modern improvements in the schemes for the reconstruction of the setting brickwork of the installation at the Wola Gas-Works, Warsaw.

The most important of these improvements in the design of the setting, as embodied in the scheme for the reconstruction of the settings, are briefly set out below:

(1) Adoption of the "key" type of retort.
(2) The heating system of each unit of four retorts to consist of five combustion chambers and five circulating chambers on each side of the carbonizing units, as compared with the earlier design comprising seven combustion chambers and three circulating chambers. Means also provided to admit producer gas and secondary air to the two bottom circulating chambers so that a limited amount of combustion may take place round the upper portion of the retorts, in cases where this proves necessary or advisable.
(3) The main secondary air introduced into the combustion chamber immediately above the level of the nostril opening for the admission of producer gas, instead of being arranged in the same horizontal plane. The inlet openings for producer gas and air separated by means of a horizontal tile, which ensures that the producer gas and secondary air enter the combustion chamber in two separate but parallel streams of flow, thus securing a long and "lazy" flame giving the most uniform conditions of heating over the entire length of each individual combustion chamber.
(4) The admission of producer gas to the individual combustion chambers controlled by special nostril plugs, each arranged with a circular orifice of predetermined cross-sectional area. The former type of damper brick, arranged on a ledge in front of the producer gas inlet opening, often collected a certain amount of flue ash, and this accumulation of dust frequently rendered it difficult to adjust the damper brick to a new position with the requisite degree of accuracy.
(5) Similarly, the nostril openings for the admission of the auxiliary supply of producer gas and secondary air to consist of specially shaped inlet blocks, so that the gases enter the combustion chamber in a direction more nearly parallel to the main flame.
(6) Two main vertical producer gas flues and two main secondary-air uptakes, each uptake and flue being separated by a wall of brickwork, arranged to each unit of four retorts, thereby ensuring that the horizontal pressure exerted by the thermal expansion of the four retorts is transmitted through this solid wall of brickwork to the bench bracing steelwork.

General.

In drawing up the building programme, particular care had been taken to avoid the erection of new refractory materials against adjacent "hot" settings, and to ensure normal conditions for the workmen. Only minor repairs were carried out to the existing step-grate producers, such as new hardburnt fireclay linings for the internal walls, together with the building of relieving arches in the front walls of each producer, to permit of the renewal of the cast-iron lintels over the clinkering openings.

Gas-making on the first two reconstructed settings was commenced on Aug. 14, 1937, and the last two settings were put into operation on Sept. 28, thus anticipating the completion date on the original building programme by 2½ months. The greater part of the materials and labour used on the reconstruction was supplied from Polish sources. The close collaboration of the Gas-Works Engineers and Administrative Staff, the keen co-operation of the workmen, and the capable participation of the various sub-contractors contributed very largely towards the successful execution of a difficult but extremely interesting programme.

Athletic and Social

Liverpool Employees Entertained.

The culmination to the celebrations which marked the opening of Radiant House, the new headquarters of the Liverpool Gas Company, by the President of the Board of Trade, to which we have already referred in the "JOURNAL," came on the evening of Jan. 25, when 1,800 guests, composed of employees of the Company and their families, were entertained to a dance at the Renshaw Hall.

During the evening the Chairman of the Company, Sir Christopher Clayton, addressed the gathering, and said that the Directors would have liked to see every member of the staff present, but some of them had to remain on duty to "Keep the home fires burning." With Sir Christopher were Mr. V. Stuart Cox, Vice-Chairman, Mr. J. Sandon Stubbs (Secretary and Treasurer) and Mrs. Sandon Stubbs, and Mr. Ernest Astbury, the Chief Engineer.

There was a real carnival spirit abroad in the hall, which was gaily decorated, and carnival novelties added to the gaiety. Each of the cabaret artistes was given a great reception, and the personal appearance of Mr. Therm and Mr. Regulo added considerably to the fun of the evening. A topical touch was lent when Phil Foster and his band played the Gas Industry's new theme-song, "Meet Mr. Therm," which made an immediate hit.

The Supervision of Distribution Systems

Use of Velocity Measurements

G. Goos in *Das Gas- und Wasserfach*, 1937, **80**, 407-415 (June 12), discusses the utility of gas velocity measurements in connexion with the systematic supervision of gas distribution systems. In Hamburg, where such measurements have been made over a period of nearly thirty years, the distribution system is supplied at three points by the Grasbrook, Barmbeck, and Tiefstack works. Pressure measurements, however systematic, gave no indication as to the parts of the grid supplied from each works.

It was intended that the measurements initiated in 1911 should provide information relative to the velocity and direction of flow of gas in the individual mains and thereby lead to important conclusions in connexion with the extension of the system and the selection of mains of appropriate size. Subsequently, the view was formed that velocity measurements are a valuable adjunct to pressure measurements in the normal routine of the supervision of mains since they reveal the load factor of the main and its fluctuations. While such measurements are of especial importance at Hamburg by reason of its three sources of supply, their importance in normal cases where only one supply is involved cannot be overestimated.

Due to the close interlacing of the distribution system of a town, flow diagrams and load factors are often obtained which are not only contrary to all expectations but could not be predicted even as a result of the most elaborate calculations, since there are so many points of consumption and each is subject to wide variations in terms of time and volume. It is fundamentally more important to know the peak loads of the individual mains at the time of the week-end cooking load than it is to know the peak load of the exit main from the works. The inadequacy of pressure measurements is evident from the fact that, at a particular point at which the pressure remained steady at 3½ in. w.g. over the major portion of the day, the velocity of the gas fluctuated between 2·6 and 10·9 ft. per second.

As regards the choice of an instrument for the measurement of the velocity and direction of flow of the gas, the essential requirements are that the meter should have an adequate sensitivity, afford a true indication of the velocity either directly or indirectly, and show the velocity as a function of time.

In general, meters of the orifice or impact-tube type are useless for low-pressure mains since the velocity is too low. They are of use in high-pressure mains if the velocity is sufficiently high, the limit being about 1·6 ft. per second when the pressure is of the order of 10 to 12 lb. per sq.in. Impact tubes of the Prandtl type were first used at Hamburg in 1913 on the high-pressure natural gas mains from Neuengamme to that city and proved satisfactory in view of the high velocity which prevailed.

For the measurement of low velocities, swinging vane meters were first employed. They suffer from the drawback of a high frictional resistance of the vane and of the indicating mechanism. Attempts were made to reduce friction by the use of an electrical indicating device instead of one of a mechanical type and of a leather vane mounted between two gimbals. The modified instrument did not, however, fulfil expectations.

In 1932, a propeller type of instrument became available, the propeller being sufficiently small to enable the instrument to be inserted into the main through a 2 in. hole. An electrical recording device with irregularly spaced contacts was incorporated and the relative sequence of the contact marks on the chart gave a clue to the direction of flow. This propeller instrument gave satisfactory results with velocities between 2 and about 30 ft. per second but suffered from the drawback that the friction of the bearings increased through wear and as a result of fouling, hence readings became erratic.

A really satisfactory solution of the problem was only possible when, in 1933, the hot-wire anemometer was introduced. It was, however, necessary to evolve a suitable design with a view to the use of the instrument in a closed main for the simultaneous indication of the direction as well as the magnitude of the flow. In the calibration of the instrument, the empirical relationship was deduced that with air and town gas the indicated velocity is inversely proportional to specific gravity. A baffle fitted at the side of the hot wires occasions a fall in the indicated velocity if the instrument head is in such a position that the gas stream strikes the baffle before it meets the wires and a smaller fall if the instrument head is rotated through 180° so that the gas meets the wires first, the maximum indication being obtained when the baffle and the wires are both in a plane at right-angles to the direction of flow. Observation of the effect produced by rotation of the instrument head thus enables the direction of flow to be deduced even if the exact orientation of the main in the ground is unknown. The hot-wire anemometer is suitable for the accurate measurement of velocities ranging from about 60 ft. per second to as little as 0·4 in. per second. It is not applicable in the case of a saturated gas subjected to cooling since the hot wires re-evaporate some of the condensed water and the readings are thus affected.

A further problem was the provision of means for the conversion of the instrument from an indicating to a recording type. An optical method was adopted, the position of the galvanometer needle being recorded on a strip of photographic paper mounted on a clock-driven drum through the agency of a lamp and a system embodying two slits, a lens, and a mirror, the latter being mounted on the needle. The curve obtained must be replotted on squared paper with use of the calibration curve of the instrument since the record is not a linear function of the velocity of the gas.

Skill in the use of the instrument is necessary for a large number of manual operations is involved and it needs but the omission of one to invalidate the whole measurement.

Diagrams showing the flow characteristics of portions of the Hamburg distribution system are given in the original, the effect of the substitution of a larger main being also demonstrated. Velocity measurements were made at 300 points. Though each of the three works serves a definite region, there are boundary regions supplied at times by one and at other times by another of the works. In these regions, alterations in the incidence of the supplies are explored by means of quarterly measurements of the magnitude and direction of the flow in the individual service mains. The load-factor diagrams enable useful conclusions to be drawn, for example as to the feasibility of connecting commercial consumers in a district largely supplying domestic consumers and where the peak load is of short duration and confined to a particular hour on Sunday during which a heavy cooking load comes on. The opinion is expressed that, in low-pressure systems, the normal velocity should not exceed 5 ft. per second if an undesirable drop in pressure at peak loading is to be avoided.

The Trencherbone Seam*

Fuel Research Survey Paper

The Trencherbone seam, constituting a valuable part of the coal resources of the Lancashire coalfield, forms the subject of a report just issued by the Department of Scientific and Industrial Research in pursuance of the work of surveying the coal seams of the country. The report covers this important seam as it occurs in the central part of the South Lancashire area, between the Kirkless or Great Haigh Fault on the west and the Irwell Valley Fault on the east. This district is not so heavily faulted as those lying on either side of it and thus there are fewer difficulties in correlation, although the seam is known in the western part of the district as the Wigan Six Foot and the Hindley Green Five Foot.

The outstanding value of the Trencherbone seam lies in the Top Hard coal, which is a high-quality domestic fuel. Among commercial fuels, the nuts and slacks and washed grades are of high quality, being used principally for industrial steam raising and also for gas manufacture, both alone and in conjunction with other fuels.

* Fuel Research Survey Paper No. 40—"The Lancashire Coalfield. The Trencherbone Seam Part I." Published by H.M. Stationery Office, price 2s. 6d. net.

Rural Gas Service

From a Paper read at a meeting of the Western Junior Gas Association at Weston-super-Mare on Jan. 22, the PRESIDENT (Mr. J. E. Akroyd, Swindon, G.W.R.) in the chair.

by
A. G. HOLTAM,
Distribution Engineer, Cheltenham and District Gas Company.

The Gloucester Gas Company's boundaries adjoin Cheltenham's to the west and south-west at distances of about four or five miles from Cheltenham Works. Low pressure extensions have been made at various times in these directions and the two companies' mains are close to one another at several points. The most promising areas left open for development were to the north-east, north, and north-west; and the extensions to which I shall later refer are chiefly in these directions. The Cheltenham Works are at the extreme south of the district (or nearly so), and the position in relation to our outer areas can hardly be described as ideal.

In 1906 one 6 in. steel main (3·37 miles) was laid for a low pressure supply to the village of Bishops Cleeve and another similar main to supply Cleeve Hill (3·5 miles). No further extension of note was made until 1930, when the Tewkesbury Undertaking, 8¼ miles to the north-west, was absorbed. To supply this new district in bulk a 6 in. welded joint steel main was laid from the Cheltenham Works and terminated at the Tewkesbury holders. A large village (Bredon) 3·3 miles to the north-east of Tewkesbury was considered worth exploiting, and a 6 in. steel main was laid to supply it at low pressure from Tewkesbury. In the same year the Winchcombe Undertaking, 9 miles north-east of Cheltenham, was also purchased. A 9 in. reducing to 6 in. steel main was laid from Cheltenham Works to supply the district, 1·9 miles of the existing Bishops Cleeve main being utilized as part of the feeder main.

It was not until 1933 that any question of further main extensions arose. At about the same time during that year decisions were made to supply both Pershore and Broadway.

The Pershore Undertaking, 7½ miles to the north of Bredon, was absorbed and the 6 in. Bredon main extended to supply this new area in bulk, the main and services being converted for pumping. The main passed close to several villages which were later also supplied. No further pumping mains have been laid in this direction to date, but low pressure extensions have been made to the north and east to supply several villages, the farthest being Fladbury, 24 miles from Cheltenham.

Broadway, 7 miles to the north-east of Winchcombe, had for many years a local gas undertaking, but the company went into liquidation in 1929, and from that time to 1933 the village had been without a gas supply. Despite the fact that the electric power company had been without a competitor for four years, it was decided to lay a 6 in. main from Winchcombe, erect a new holder at Broadway, and completely re-main and re-service the village.

At that time no further pumping main extensions could reasonably be anticipated, and Broadway mains were interconnected as a normal low-pressure district. Low-pressure 6 in. extensions were also made from Broadway to Childswickham (1·33 miles west), Badsey (4·9 miles north-west), and Willersey (1·78 miles north-east).

In 1934 a major juncture in the Company's history was reached. In that year control of the undertaking was acquired by the Severn Valley Gas Corporation as the first unit of their present group.

At a later date control of the Chipping Campden Gas Company was also acquired by Severn Valley Gas Corporation with intentions to supply from Cheltenham. A 6 in. spun iron main with Stanton Wilson joints was therefore laid from Willersey to Campden. To enable this to be used as a feeder main it was necessary to separate the various Broadway service mains. Campden, 24½ miles from Cheltenham, is the present terminal of our pumping mains in this direction, but low-pressure extensions have been made to the east and south, the furthest being Blockley, 30 miles from Cheltenham.

Late in 1935 the Bidford-on-Avon Gas Company was also purchased by the Severn Valley Gas Corporation, and to supply this Company with gas the existing main from Broadway to Badsey was converted for pumping and 6·6 miles of 6 in. main laid from Badsey to Bidford, 28·75 miles from Cheltenham. A low-pressure main has since been laid north to Broom, 30 miles from Cheltenham, and further extensions to the west are under consideration.

Off the various pumping mains, low-pressure extensions have been made to villages too numerous to mention here.

From the foregoing it will be seen that the various main extensions have been made as and when new undertakings have been acquired, and that at the time it was impossible for anyone to anticipate the various developments and consequently the throughputs required of the pumping mains. Taking into consideration all the circumstances, I think we may congratulate ourselves upon having so workable a system. It is perhaps a recommendation for the elasticity of high-pressure distribution, especially as at present our pressures are moderate and pumping periods part-time only.

The statutory area of Cheltenham is 302 square miles. The non-statutory areas of Campden and Bidford are administered as Cheltenham and at present amount to approximately 17 and 4 square miles respectively, making a total area of 323 square miles. The total mileage of main for the combined companies is 264·6 miles with 25,406 consumers. Sales of gas for 1936 amounted to 710 million cu.ft., or 27,900 cu.ft. per consumer, or 2·68 million cu.ft. per mile of main.

System of Supply.

All gas is manufactured at Cheltenham and the method of distribution to various works, or, rather, storage stations, has been kept as simple as possible. There are, however, one or two points that may be of interest.

Two Waller steam-driven single line vertical enclosed compressors are in use at Cheltenham, each rated at 40,000 cu.ft. per hour at 20 lb. per sq.in. Actually during a test with Pershore and Bidford holders only open, 40,000 cu.ft. was obtained with one compressor in operation at 7 lb. The maximum initial pressure at present required is about 4½ lb. per sq.in.

Compression usually commences at 6 a.m. and continues during the day until such time as all district holders are full; the pressure is then reduced to about ¾ lb. until 12 midnight. At other times the mains are supplied by the various holders. The maximum pressure of 4½ lb. is, however, in any case maintained from 11.30 a.m. to 1.30 p.m.

Branch extensions to villages en route are usually controlled by constant outlet pressure district governors. Houses, &c., en route are supplied via suitable service governors.

District Storage.

With alternating high and low pressure long distance distribution, adequate district storage is, of course, necessary. All undertakings taken over, with the exception of Tewkesbury, were found to be very badly served in this respect, in both capacity and condition. The working holders at Pershore, Winchcombe, Broadway, Campden, and Bidford have all been erected since the Cheltenham mains were extended to supply these districts, and Tewkesbury single lift holder was converted to double lift.

Ignoring old small holders the following are details of present storage:

Station.	Capacity, Cu.Ft.	Pressure, Tenths W.G.	Distance from Cheltenham.
		Max.	Miles.
Cheltenham (3)	2,800,000	67	..
Tewkesbury	145,000	92	8·83
Pershore	100,000	78	19·28
Winchcombe	60,000	71	9·0
Broadway	100,000	77	16·0
Chipping Campden ..	60,000	73	24·5
Bidford-on-Avon	100,000	95	27·5

The Cheltenham-Tewkesbury-Pershore main is operated as follows: Gas is pumped from Cheltenham into the Tewkesbury holder. When this holder is full the automatic holder inlet valve closes and the gas passes on to Pershore. When Pershore is full, the Pershore resident fitter telephones Cheltenham and pressures at Cheltenham are reduced to about ¾ lb. or, if after midnight, 6 in. w.g.

At periods of low pressure the Tewkesbury holder automatically feeds into the main a governed pressure of 8·5 in. w.g. and Pershore holder 7·8 in. Gas is therefore inclined to flow from the heavy Tewkesbury holder towards both Cheltenham and Pershore. The flow of gas from Tewkesbury to Pershore during the night is useful in that the latter is gently fed by gravity. To eliminate any possibility of the Pershore holder blowing, the inlet main is being fitted with an automatic holder valve.

A Widlake indicator registers in the Cheltenham compressor house the height of Tewkesbury holder and the pressure in the Tewkesbury-Pershore feeder main. The pressures and heights thus shown at Cheltenham are an indication of all the relevant conditions at Tewkesbury. I may explain that no one is employed at the holder site, which is some distance from the local showroom and depôt. The feeder main does, however, pass the showroom, and a pressure gauge is under observation in the office.

At the various stations are stand-by compressors so that in the event of an interruption in the supply from Cheltenham high-pressure gas could be fed into the feeder mains at times of maximum load.

Our extensions in recent years have been so rapid and conditions changed so frequently that it has not been possible or even advisable to complete all arrangements immediately. The position is, however, now fairly clear, and completion of final details can be proceeded with. This is receiving attention as fast as circumstances will permit.

Mains.

No mains over 9 in. or less than 4 in. diameter have been used in the country extensions. Owing to the varying types of ground in which pipes have been laid, the costs, apart from reinstatement, naturally show some variation. The following average costs of 6 in. and 4 in. sizes may be of interest:

Main Laying Costs.

[Excluding reinstatement.]

Pipe.	Joint.	Size.	Average Price per Yard.				For Jobs Over 500 Yd.	
			Pipe Only on Site.	Joints and Specials.	Labour.	Total.	Max.	Min.
		In.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Steel	Welded	6	7 6	1 0·87	2 6·21	11 1·08	—	—
„	Lead wool	6	7 4·82	0 6·56	2 3·13	10 2·51	10 4¾	8 6
„	„ „	4	4 7·66	0 5·65	2 0·95	7 2·26	8 5	6 1¾
Spun iron ..	Stanton Wilson	6	6 1·32	1 4·67	2 6·21	10 0·20	10 9½	9 1¾
„ „ ..	„ „	4	3 7·32	1 1·76	2 5·72	7 2·80	8 7	6 1¾
Everite ..	Compression	6	3 11·25	1 1·28	2 0·06	7 0·59	—	—
„ ..	„	4	2 6·75	0 11·8	1 11·25	5 5·80	—	—

The average labourer's rate being 12½d. per hour.

The above averages cover some 140 odd miles of country pipelines. To attempt to average reinstatement costs would merely be misleading.

I have known at 1,300 yd. job to average 6s. 6d. per linear yard and others of much greater length to involve no reinstatement charges whatever.

Trench Reinstatement.

Reinstatement charges can make a very considerable difference to the all-in costs, especially with modern roads and the various and sometimes unreasonable requirements of surveyors. The area covers a great variety of roads and paths administered by three county, five rural district, and two borough councils. It also embraces some seventy odd parishes. The class A roads under the county councils are sub-divided into eight "divisional districts."

In some cases we complete reinstatement and occasionally a contractor has been employed. In the majority of cases, however, arrangements have been made for the road authority concerned to carry out the work. The following are examples of costs of reinstatement:

Charges for Permanent Reinstatement of Road Openings.

—	Up to 5 Sup. Yd.	5 to 20 Sup. Yd.	20 to 100 Sup. Yd.	Over 100 Sup. Yd.
	s. d.	s. d.	s. d.	s. d.
Carriageway—				
Bituminous 2 in. carpet coat ..	5 6	4 9	4 0	4 0
Tarmacadam 3 in. consolidated ..	5 0	4 6	3 9	3 6
Macadam, waterbound	3 6	3 3	3 0	2 9
Surface dressing—Tar or cold emulsion..	6 sup. yd.—any area.			
Concrete in foundation (6 in. thick min.)	8 0 sup. yd.—any area.			
Footway—				
Brick paviors not on concrete (excluding new bricks)	2 6	2 3	2 0	2 0
New slabs	3 6 sup. yd.—any area.			
Flags, natural or artificial (exclusive of new flags)	2 0	2 0	1 9	1 6
Concrete (*in situ*) paving	5 0	4 6	4 0	4 0
Asphalt or tar paving	2 6	2 3	2 0	1 9
Tar sprayed gravel	2 0	2 0	1 9	1 6
Gravel	1 6	1 3	1 0	1 0
Ashes	9	6	6	6
Kerb on concrete (excluding new kerbs) lineal	4 3	4 0	4 0	4 0

The method of backfilling varies slightly in different districts, but generally is as follows:

We backfill trunk roads and (usually mechanically) ram materials as taken out, finishing with 6 in. concrete and top-dressing.

We backfill side roads with materials taken out unless the council think pitching desirable, in which case they supply free of charge. Occasionally we have supplied our own pitching. The trench is allowed to settle and is then top-dressed.

Trench reinstatement in modern roads is a very different matter from that envisaged when our statutory regulations regarding them were framed. I should welcome information from members as to how their respective undertakings view the subject.

Generally, the highway authorities keep us informed of their intended road repair work so that we may first proceed with any contemplated pipe laying. In such cases no charge is usually made by them for permanent reinstatement of our trenches. Alterations to our pipes, &c., necessitated by road reconstruction are, of course, chargeable to the Council.

For many reasons the grass verge is the most desirable pipe position. Our legal right to these sites has been challenged on several occasions by owners of adjacent property. In only two or three cases has the matter been pressed, and with these purely nominal annual payments were eventually agreed upon.

It is surprising how often an innocent-looking country grass verge can prove to be full of other services. All our workmen are impressed with the importance of reporting all damage to other services, no matter how slight. This on the understanding that they will not be penalized. We have had a special arrangement with the Post Office for some two years which enables our workmen to use telephone kiosks free of charge when enquiring regarding positions of cables, informing them of manhole cover lifting, &c.

Both high and low pressure service mains are dealt with in

the same manner as feeder mains, except that whenever the number of premises and width of road warrant a pipe is laid on each side of the roadway. On council housing estates the mains are laid at the rear of the houses and in such cases the length of service from main to meter frequently does not exceed 6 or 7 ft.

Our gas is "dry" and it is unusual to obtain liquor from the syphons except on the pumping mains adjacent to the compressors. The tubes of these syphons are fitted with cocks so that it is only necessary to connect to the cock, turn on, and the gas pressure empties the pot.

District Governors.

The chief points for consideration in deciding whether to break down pressures in the district mains or in the separate services are the number and type of premises to be served, the length of main, and the comparative costs. With alternate high and low pressure supply advantage cannot be taken of small mains with service governors, and unnecessarily to subject long runs of branch mains to high pressures is undesirable.

To permit the passage of ample gas at periods of low pressure, all governors are fitted with large area dual valves. Despite the fact that our present highest pressures are actually only moderate, the conditions to be met are really rather severe by reason of the extreme variations in pressures and demand and their incidence. Especially does this apply to newly developed villages. With the latter it is quite true to say that at times no demand whatever exists for gas and it is at these times necessary for the valves to close with absolute tightness.

Some of our first district governors were fitted in pits. In such positions they are difficult to maintain and subject to the serious consequences of flooding. In positions liable to flood, the atmosphere vent is fitted with a tube led underground to a hedge or wall, extended to a height out of reach and the terminal protected. It is, of course, necessary to make the whole watertight, including the hand lid to loading chamber. Provision should also be made for the collection of condensate.

Whenever possible, however, I strongly advocate fitting the governors with by-passes, &c., above ground and protected by a suitable kiosk or brick built shelter. All parts are then readily accessible and free from flooding and unauthorized interference. Our kiosks are painted green to harmonize with the countryside and fitted externally with suitable description plates.

Services.

Protected steam steel tube is used for all services, the joints being wrapped *in situ*. When welded joint steel mains were being laid a connection was welded in for every house en route. Otherwise "Du-ex" Nipples are used for steel mains and saddle clips for Everite. Tube of ¾ in. diameter is occasionally used for small cottage property, but generally 1 in. is considered a minimum.

When the country extensions were first commenced our terms for services were "40 ft. free, remainder at cost." It soon, however, became apparent that these terms would not enable us to pick up a large number of premises and obtain full benefit from the high capital expenditure on mains. Our terms were therefore adjusted to "75 ft. free, remainder at 9d. per foot irrespective of size," except that, "lengths over 200 ft. to be considered on merits." These terms apply to existing houses only, and in the case of new villages are not too strictly interpreted. For new buildings a charge of £2 is made for the first 75 ft. unless the house is piped during erection for not less than cooker, wash boiler, and two gas fires. Special terms are quoted for such a carcass.

To obtain a view of prospective country service costs it is convenient to deal with average "price per service" rather than "price per ft" and I give below costs based upon 700 of our latest services.

With country services the labour charges are comparatively high; on the other hand, reinstatement charges are usually low.

For services off the feeder-mains "high-low pressure" diaphragm type governors are usually employed, but some Newbridge piston type are also in use.

For main and service laying, labourers are obtained from the locality and we find this creates considerable goodwill. Most of these labourers prove to be good workmen and their local knowledge is valuable.

Costs of Country Services (All Sizes) Excluding Reinstatement and Service Governors.

District.	No.	Average.			Max. Service.	Min. Service.
		Labour.	Material.	Service.		
		£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
A	83	1 15 5	1 6 8	3 2 1	11 8 6	1 0 4
B	139	1 15 3	1 7 11	3 3 2	9 9 8	1 1 8
C	192	1 19 5	1 9 3	3 8 8	11 7 7	1 4 2
D	35	1 17 11	1 2 10	3 0 9	6 19 5	1 0 7
All country districts ..	700	1 17 5	1 10 6	3 7 11	—	—

Distribution Systems Taken Over.

When taking control of the various absorbed companies it was necessary to give immediate attention to holders, mains, services, and meters. As an instance, one of the companies, just prior to purchase by Severn Valley Gas Corporation, had lost its public lighting contract for the reason that, due to blocked and corroded services, no gas was available at many of the lamps. A 7,000 cu.ft. holder was in use and the mains and services were small and in bad condition. The sales had dwindled to 2 million cu.ft. per annum with 156 consumers.

This district has since been practically re-mained and the gas sales for 1937, three years after absorption, have risen to 12½ million cu.ft. with 829 consumers.

Breathing Apparatus.

I am reluctant to leave this part of my Paper without reference to breathing apparatus. Working with gas at high pressures is very different from the usual town pressure, but even with the latter accidents can occur. I think men become so accustomed to working with gas that quite unnecessary risks are frequently undertaken. Carbon monoxide filters and masks, and fresh air supply apparatus, are kept available for use. With the former, although it leaves the wearer mobile, I find that the workmen look upon the filter as a mystery box and appear dubious of its efficacy. With the fresh air apparatus, while the movement of the user is limited by the length of the hose, it can be used in any atmosphere, is readily understood by a workman, and consequently is used by him with confidence. Portable "Sparklet" CO_2 apparatus is also available. I am wondering if it would not be possible for the makers of the latter to provide oxygen in similar small cylinders and capable of being used in correct proportions with the CO_2 via the mask. It would perhaps be necessary to ensure that the oxygen could not be used in the CO_2 gun, and *vice versa*.

District Organization.

With the development of new districts, local depôts have been established at the holder storage stations of Tewkesbury, Pershore, Winchcombe, Broadway, Campden, and Bidford, and in each case consist of a showroom and store in charge of a local representative. Small stocks of appliances and materials are maintained, but generally it has been found convenient to make up full motor loads for delivery direct from Cheltenham to the respective consumers. For this purpose the Cheltenham fleet of motor vehicles is utilized.

In the early stages of development Cheltenham fitters and service layers are employed. As soon as convenient a local resident fittings staff is formed. These staffs are never large and it is necessary from time to time to give assistance from Cheltenham. For this purpose a staff of mobile fitters with service motor vans is maintained. These fitters are despatched from Cheltenham complete with materials and have proved to be invaluable.

The local representative is responsible for his district generally and is in contact with Cheltenham by telephone. Gas accounts are payable at the local showroom, but all costing, accounting, advertising, and other administrative work is carried out at Cheltenham.

The Distribution staff are provided with motor vehicles and carry out their respective duties in the country as in Cheltenham. The sales staff of the Company and of Severn Valley

Gas Corporation are available when required in a similar manner.

In the larger villages not provided with showrooms the window of the local ironmonger or other tradesman is frequently used for the display of appliances. Trade discounts are allowed to builders, plumbers, electricians, &c., upon orders obtained by them.

Costing Prospective Extensions.

To determine whether a proposed extension will prove profitable or not the mains are provisionally costed and reduced to a price per house. Of the existing houses, 80% are taken as probable consumers, and this usually proves to be a conservative figure. The "cost of main per house" that can be afforded depends upon the prospective consumption and profit per therm. Gas prices vary throughout the country areas and in some districts a higher main charge can be afforded than in others.

Mr. H. J. Escreet, in his Paper presented to The Institution of Gas Engineers in June last, considered that 5% interest, 2% depreciation, and 1% maintenance were required on mains capital, making a total annual charge of 8%.

The profit on gas sold by Cheltenham in 1936 was 1·67d. per therm. In the outer areas the sales per consumer averaged 84·6 therms, with differentials above Cheltenham of 3·75d., 4d., and 5d. per therm.

Taking the differential of 4d. *plus* the profit of 1·67d. we get 5·67d. If 1·27d. is allowed for extra boosting, collection, and maintenance, a net profit of 4·4d. is shown. At 4·4d. per therm, 84·6 therms give an annual profit per consumer of £1 11s. At 8% this would provide for a capital expenditure of £19 7s. 6d. less, say, £3 7s. 6d. for service, leaving the maximum profitable expenditure on mains as £16 per house or, in districts with a differential price of 5d., then £20 7s. 6d. per house. Our village extensions have rarely even approached these figures without taking into account building developments which, as a rule, follow the laying of mains.

Conditions Affecting Sales.

Until recent years the majority of residents within our country areas had neither electricity nor gas available and their mode of assessing the value of heating and lighting services had been based upon the cost of solid fuel and oil. In most of the districts electricity was in the field before us and had made considerable progress. Customers had been obtained for lighting, cooking, and other domestic purposes. These, while having been educated to appreciate a service of greater refinement than that to which they had hitherto been accustomed, had compared costs with older methods. Electricity had acquired the reputation of being "dear."

When our mains are extended to new areas the prospective cost of gas is compared with electricity rather than with solid fuel or oil.

The costs of electricity and gas vary somewhat and are, of course, higher than those obtaining in urban districts. The following are details of prices at present ruling for domestic purposes in the greater part of the new territory.

Charges for Electricity and Gas.

—	Electricity, Pence per Unit.	Gas, Pence per Therm.	Gas, Pence per Unit Utilised.*
Lighting	6 d. to 8 d.	12½d.	0·64d.
Heating and cooking	1½d. to 1½d.	to	to
Water heating	⅝d. to ⅞d.	14d.	0·7d.

Electric domestic "all-in rate" 3s. per room per quarter *plus* 1d. per unit.

* Taking the utilization efficiency of one therm of gas to equal twenty units of electricity.

Cookers.

Gas cookers are supplied to prepayment consumers on "free" hire or by no-deposit hire-purchase via the cash rebate. (Rebates are 7d. and 8d. per 1,000 cu.ft.) Both prepayment and quarterly consumers can obtain cookers by simple hire, various methods of hire-purchase, and, of course, for cash. With the exception of "free" hire and simple hire, any other apparatus may be obtained by the same methods, and in all cases the fixing charges are included in the price.

These prices and terms enable us to obtain immediately practically the whole of the cooking load from electricity and readily make substantial sales of cookers to households previously using solid fuel or oil.

I say "prices and terms," but these alone could hardly explain the ease with which cooker sales have been effected. A major consideration has been speed, especially of the hotplate. Speed is a convenience for which consumers are prepared to pay. It will bring the hotplate into use even when solid fuel fires are available at no extra cost. For this reason I would hesitate to recommend a cooker, unless at least one boiling burner is capable of an output of 12,500 B.Th.U., or, for preference, 14,000 B.Th.U., per hour. A similar point can be made for other gas apparatus, water heating in particular.

Domestic Lighting.

With consumers not previously supplied with electricity we find a ready sale for gas lighting, mainly by means of prepayment installations, but a considerable number of quarterly consumers are also supplied. A very satisfactory feature has been the number of electric light users since fitted with gas lighting. Some have been in good class property and a large number in cottages and council houses. With prepayment consumers we fit up to four free lighting fittings complete with mantles without interfering with existing electric fittings. A gas light in the living room only can account for most of the lighting load, and a fitting off the cooker supply in the kitchen is easy and profitable.

Wash Boilers.

The gas wash boiler has also found a ready sale and has solved the hot bath water problem in smaller houses. In most cases the appliance is fitted with gravity feed to the bath tap. The latter arrangement is standard with most council houses and gives entire satisfaction to this class of consumer at a moderate installation and operating cost. During the last three years 900 "bath attachment" installations have been made in new council houses alone.

The following details of consumption tests may be of interest. Check meters were fitted and left for a period of four weeks. The number of tests is not very large but the results provide a useful guide.

Wash Boilers with Bath Attachments.

Test Number.	Occupation.	Number in Family.		Consumption, 4 Weeks' Period.
		Adults.	Children.	
				Cu.Ft.
1	Bricklayer's labourer	2	1	450
2	Cable layer	2	2	550
3	Stoker	2	1	250
4	Roadman	2	4	650
5	Postman	2	7	1,450
6	Widow	1	1	200
7	Labourer	2	2	200
8	Gardener	2	3	1,000

The average was therefore 593 cu.ft., or, say, 7,700 cu.ft. per consumer per annum.

While the majority of country property is tenanted by agricultural labourers, the other extreme of the social scale is well represented, especially in the Broadway and Campden districts. In this better class property sales of gas fires, refrigerators, hot water, and central heating appliances help to keep the local salesmen happy.

The "country" and "town" conditions affecting the sale of gas fires are very similar except that the country price of gas is inclined to retard them somewhat.

Sales of refrigerators have been very good, partly due perhaps to the fact that larger quantities of food are usually stored in rural districts. My own separately metered L22 used in a normal manner has consumed an average of 236·8 cu.ft. per week (max. 267, min. 175). An extra annual consumption of 12,000 odd cu.ft. per consumer so fitted is a very attractive additional load, apart from the moral influence upon the public. But, and it is a big "but," this field is not reserved to the Gas Industry, and energetic and aggressive salesmanship is necessary.

Public Lighting.

None of the lighting authorities outside the Borough of Cheltenham are interested in the distribution of electricity.

We are, however, in very keen competition with the grid. I say it with some little pride that we have never lost a single lamp outside Cheltenham Borough. The present number in use is 532. On the other hand, some hard won little victories have come our way. In particular, this season we have obtained the contract for lighting the complete installation of 59 lamps at Broadway. This had been all electric since 1929 when the old Broadway Gas Company went into liquidation. We have also this season obtained all extra lamps required (29) in three other districts, despite the fact that in each case our competitor holds the current contracts. Little successes of this kind are very heartening, and the publicity they receive assists in obtaining other types of business.

It is, of course, impossible at this stage to see how the recent Ministry of Transport Street Lighting Report will affect the lighting of villages, many of which are on traffic routes. It is, however, imperative that the Industry make very special efforts to ensure that fair consideration is given to gas, and the prompt issue of literature by the B.C.G.A. following the recent Report can well serve as an example to individual undertakings.

Incubators.

An interesting installation on the district consists of an incubator house centrally heated by means of an "Ideal" 2 G.B.5 boiler. The hot water supply is obtained from the same source. Four incubators accommodate 16,128 eggs each and are individually heated by 40 cu.ft. per hour circulators. These were originally made for oil firing and actually the whole installation has been moved some miles to our mains to enable gas to be used. The main consideration was the dependability and easy control of gas. The proprietor has improved his hatch by 5%, and with 64,512 eggs valued when hatched at £2,100 the running cost of gas is negligible.

Gas Sales.

These areas are still in the early stages of development, but an indication of the progress being made is the gradual and consistent increase in gas sales of the Cheltenham Undertaking as follows:

	Cu.Ft.
1934	628,925,900
1935	646,808,800
1936	696,759,800
1937	715,854,000

It will be realized that a large proportion of our rural business has been obtained from a powerful and well entrenched electrical competitor. For this reason I have omitted to give records of appliances sold. Such information would probably be of more interest to our competitor than to yourselves.

Appliance sales records are, of course, a most useful guide to any undertaking's progress, and in newly developed territory are of even more value as indicating new business. However, it should be borne in mind that a small number of sales in some circumstances may be of much greater merit than a large number under other conditions, and the true merit of sales can only be gauged by balancing opportunity against achievement. Conditions vary throughout our districts and the only claim I wish to make is, that one of the Cheltenham Company's main achievements has been the creation of its own opportunities.

Discussion.

The PRESIDENT (Mr. J. E. Akroyd) expressed the opinion that the price of carcassing given was rather low.

Mr. A. R. LANGFORD (Plymouth) asked whether the reinstatements given carried any time guarantee, and if in the cases where appliances were sold with an inclusive fixing charge it had been found that the fitters were inclined to take longer over the job. He later mentioned that in connection with the dust Plymouth had fixed gauzes at the meter inlet. The 4½ years' experience of these gauzes was that they held back the larger dust from the meter, created no back pressure when covered with a film of dust, and removal for cleaning was easy and inexpensive. He also enquired later how the positions of gas points were marked when carcassing was done before the boards were put down.

Mr. J. W. DENTON (Torquay) said he was in agreement about jobs with inclusive fixing charges taking longer. For this reason at Torquay an elaborate costing system for fitters' jobs had been started, and inspectors were informed when the cost of jobs was rising too high. In this way the tendency had been overcome. He also asked whether there had been any trouble with leakage from the Stanton-Wilson main, what type of governor was used on the high pressure jobs, and whether they were tight. He thought the cost of carcassing was high. He would welcome any information on the procedure for closing a road for mains works.

Mr. W. A. CHARD (Gloucester) said he could imagine difficulties would arise over the 75 ft. of free service pipe, if there were competitive builders on opposite sides of a road, and the main favoured one builder. With regard to renewing service pipes across a main road, it was the practice at Gloucester to use agricultural pipes round the service, then, in the case of renewal, the gas pipe could be threaded through these. He was of opinion that it was best to arrange with the local authority to do reinstatements.

Mr. A. BELL (Exeter) said that in Exeter there was great difficulty about crossing roads, and reinstatements charges were much in excess of the figures given in the Paper. He thought Mr. Holtam was wrong in using ½ in. compo to a multi-point heater. A 4-point carcass in his case cost about 45s. Did the Author give free points and free pipe with prepayment meters? In the case of ordinary meters, what was the charge?

Mr. F. W. SANSOM (Exeter) thought the concrete prices were low; no doubt this was mass concrete. At Exeter they had to put 9 in. reinforced concrete over their cuttings. He thought the price for steel specials was high. Was it the practice to insert valves on the high pressure mains, say, every 1,000 yards? Had there been trouble with dust in the mains; if so, how was it dealt with? What dressing was used for the governor diaphragms? He had found it impossible to make a satisfactory joint by using painted hessian; even when carefully done, in two years the joints had completely decayed.

Mr. A. TRAN (Bath) said he would like to know whether the gas was measured at the different holder stations; if so, by what kind of meter. He was not very favourably disposed towards "composition" mains, and would be pleased to know other views. As it was common to get scale trouble in multi-point heaters he was interested in the wash-boiler with bath attachment. How was water made to flow by gravity to the bath?

Mr. J. W. DENTON said he thought some of the reinstatements charges were high.

Mr. R. C. BEAKE (Bath) asked whether the Author favoured lap or butt welding for steel mains. When gas was to be taken to a village, was the canvass done beforehand?

Mr. F. G. CRAXFORD (Bath) asked how it had been possible to take gas mains at the rear of premises? He also thought it was unwise to compare costs of carcassing with no definition of whether taps, &c., were included, and types and size of pipe.

Mr. J. T. SPENCER (Weston-super-Mare) said no dust trouble had been experienced at Weston, possibly due to internal painting of all mains. There was an experimental "composition" main, but the type of joint was not looked on with favour in Weston. He would be interested to know what type of high pressure valve Mr. Holtam had used.

The Author's Reply.

Mr. HOLTAM informed members that the system at Cheltenham was not a true high pressure system, as it was not necessary to compress all day. In fact, for most of the day it was not necessary to compress, as the district holders were able to supply off-peak gas. The reason they had not much dust trouble might be due to the fact that the dust was deposited in the district holders. In the case where an old steel main had been utilized for the new scheme given in the Paper, dust trouble had arisen. They were in process of installing dust boxes in some parts of the system.

Regarding reinstatements, when this work was done by his Company they had to maintain the cutting for six months, but generally if anything went wrong after that period it was necessary to put the job in order. He preferred to have the work done by the local authority, and in fact this was done without exception at present. He had not noticed that his costs for fitting jobs where the price of apparatus included fixing had been higher than estimated, but he agreed that it was necessary to keep a constant watch on these items. Regarding Stanton-Wilson joints, he had not had trouble with leakage at joints, and he was very favourably disposed towards this type of main. It was necessary to bear in mind that high pressures were not used. This also applied to governors. They had experienced "building up" with piston type governors. With the type of governor described in the Paper no "building up" was found. For the dressing of these governors they used Bryan-Donkin governor dressing at regular intervals. The amount used was not a very big item, and he had not thought it worth experimenting with special dressings.

He had no knowledge of the formalities necessary in closing a road. Regarding the question of free service pipe, it was usual to arrange terms if special cases arose. If possible he would have a main each side of the road. With slot consumers the pipe and points were fixed free, with ordinary consumers the cost of the job *plus* 25% was charged, and the account settled usually without difficulty in a mutually satisfactory manner. It was necessary to bear in mind that the steel mains prices given in the Paper were for joints and specials and not for making specials alone.

The gas was not measured after leaving the Cheltenham Works. The Everite main had been in 2½ years, and apart from the fact that a length had to be relaid because a steam roller had gone into the cutting just after the main was laid, there was no trouble at all. It was laid in a grass verge. The wash-boilers had 14 in. legs, and in the houses one room was used as bathroom and wash-house, so it was simple to get gravity feed to the bath. Regarding steel mains, they used lap welded joints.

No canvass was made in the villages, as it was found without exception that 80% of the houses installed gas in any case. The main at the rear of houses was only on one municipal estate. He agreed that it was necessary to discuss carcassing with the aid of a plan. In the figure of 25s. no taps were included, as these were usually included in the price for fixing the apparatus. Double faced high pressure valves were used at about every 1,000 yards.

A vote of thanks was passed to Mr. Holtam for his Paper.

THE RECONSTRUCTION OF The Abertillery Gas-Works

by
H. T. MAYCOCK,
Technical Assistant, Abertillery Gas Department.

From a Paper read at a meeting of the Wales and Monmouthshire Junior Gas Association held at Abertillery on Jan. 22—the PRESIDENT (Mr. H. V. Williams, of Cardiff) in the chair.

With a modern carbonizing plant, as installed at our works, the amenities of the workers are catered for—quite running machinery fitted with guards and covers, platforms, landings, and staircases for easy access to all parts of the plant. Adequate ventilation and an abundance of light are considered the necessary refinements of a well-designed installation.

The introduction of the benzole plant will mean an increase in the sale of therms, although, in liquid form, will assist materially in the future prosperity of our Department by control of the coke production, by reducing the sulphur content of the purified gas (the benefits of this need no emphasis), and will encourage home production of motor spirits.

The old gasholder was rendered unsafe in February, 1932, during a severe blizzard. A new holder was required to increase storage capacity, and enable the present holder to be grounded and emptied when required for a thorough internal inspection of the lifts and tank, or a complete overhaul without interrupting the supply of gas to the town.

Intermittent Vertical Chamber Ovens.

Preparation of the site for the intermittent vertical chamber ovens was commenced in January, 1936, being completed at the end of February. The necessary portion of the old retort house, together with two beds of retorts down to cellar floor level, was demolished, and the site cleared in readiness for Messrs. W. J. Jenkins & Co., Ltd., to commence their work by May 18. In addition to the clearing of the site, two-thirds of the retaining wall was completed.

Foundations were commenced on May 18 and completed on July 7, erection of the steelwork being started the following day. Drying out fires were lit in both No. 1 and No. 2 beds on Oct. 17. The first chamber was charged on Dec. 4, 1936, ten days before the date promised by the Contractors.

New Holder.

Having decided upon the position the new holder would occupy, trial holes were made in the north, south, east, and west of the proposed site to a depth of 10 ft. below the natural ground line. The vertical section of the ground revealed the composition to be very compact, closely packed with pennant stones of varying sizes, consolidated with firm gravel. This ground had been used as a general tip for rubbish and clinker, being banked to a general height of 7 to 8 ft. Over 6,000 tons of this debris was removed from the site now occupied by the new holder.

The site was handed over to the Contractors to prepare the foundation on June 9, 1936. During the construction of reinforced concrete foundation, operations were suspended for three weeks while a drainage system was installed, which proved very effective. The foundations were completed on July 29. The concrete foundation was watered daily and allowed to harden before any load was allowed to be borne by the foundation.

Work upon the tank was commenced on Friday, Aug. 21, and the tank was completed on Oct. 1.

The inner lift was commenced on Oct. 3 and the outer lift was lowered on to the rest blocks on Dec. 2, 1936.

Water for the tank was obtained from the town main, special connexions being made for the purpose. The tank, after being filled, was again checked for level before the holder was inflated, and found correct. The holder was then connected to a blower on the inlet connexion, and a recording gauge fitted on to the outlet pipe which is diametrically opposite. The holder was then inflated to its full capacity. During this time the seams were tested with soapy water as the holder was rising; the holder cupped perfectly, and after being inflated to its full capacity, the holder was lowered to within one sheet fairly rapidly in order to detect any binding. The holder was then again fully inflated, then grounded, and any slight leakages attended to, after which it was fully inflated for the third time, and left standing for seven days. The temperature of the surrounding atmosphere and the barometric pressure were entered on a log sheet every half-hour, and the necessary corrections applied daily. During the time the holder was standing the cup seal was examined for level and soundness.

The holder having satisfactorily passed the test for soundness, it was then grounded, blower connexions were removed, flanges fitted on to the outlet crosses, and gas was turned into the holder after the purging cock on the crown of the holder had been opened. Snap samples of the gas were taken, being collected in an ordinary 6 in. main bag. A luminous burner was used for testing the quality of the gas issuing from the purging pipe. This method, although it may be termed a rough and ready means of ascertaining the quality of the mixture within the holder, proved to be quite satisfactory. The holder was fully inflated with gas on Jan. 25, 1937.

Discussion.

The PRESIDENT (Mr. H. V. Williams, Cardiff) asked what method had been employed for levelling the sand bed, and what thickness of sand was laid.

Mr. H. T. MAYCOCK replied that it was levelled with a wooden lath, the layer of the sand being 1 in. thick.

Mr. W. R. BRANSON (Cardiff), who proposed a vote of thanks to Mr. Maycock, asked what was the make per ton of coal carbonized, the amount of producer fuel used, and the composition of the producer gas. Was it necessary to increase the foundations, and what was the sulphur content of the benzole.

Mr. MAYCOCK replied that the make of gas was 17,000 cu.ft. per ton of coal carbonized and as registered by the station meter. The producer fuel amounted to 29% net on the coal carbonized. The average analysis of the producer gas was: CO_2, 3·8 to 4%; O_2, 0·2 to 0·4%; and CO, 14 to 15%. It was found necessary to increase the depth of the foundations, especially adjoining the underground tar well. There it was found that tar had been weeping through the brick wall of the well and made the ground spongy. This had, of course, to be excavated to a depth where firm ground was again found satisfactory. The sulphur in the benzole had not been tested, as the whole of their output was loaded in bulk to the purchasers' tank wagons with the exception of that used in the Department's vehicles, this being mixed with low-grade petrol.

Mr. A. E. PASK seconded the vote of thanks.

Scottish Junior Gas Association

(Eastern District)

Short Paper Meeting at Dunfermline

Some 30 Members of the Scottish Junior Gas Association (Eastern District) met in the Council Chambers, Dunfermline, on Saturday, Jan. 29. Mr. A. C. Rea (the President) took the chair and welcomed the Members.

The following short Papers were then presented:

TULLY PLANT.

By T. F. SCOTT, of Leslie.

The Tully plant described is one with mechanical operator and waste-heat boiler, the complete plant comprising a generator, blowing machinery, mechanical operator, seal box, waste-heat boiler, &c.

In addition to the usual fittings, the generator has an automatic poker attachment hanging into the retort section which helps the downward motion of the coal and prevents hanging of the mass when in a plastic condition.

The grate is of the fixed circular type and is provided with an ash rake automatically operated for the continuous removal of ash and refuse, thus doing away with the necessity of opening the plant up to shake the fire and prick the bars clear. The gas offtake pipes of the up and down runs are sealed in the box in the mid platform, their ends being closed by disc valves.

The air blast for the plant is obtained from a Roots blower direct coupled to a high-speed vertical enclosed steam engine which runs at its full speed during the blow and idles during the run. The blower, being of a positive type, delivers a constant volume of air no matter the resistance thrown by the blast.

The mechanical operator is driven by a vertical steam engine through reduction gearing and consists of a camshaft to which the operating valves of the plant are connected, one revolution of this shaft gives a complete cycle of operation to the plant. The timing of the movements of this shaft is given by a type of selector gear which operates through a tripper gear to a notched wheel on the camshaft.

The waste-heat boiler is of the multi-tubular type and gives enough steam during the blow period to supply all requirements of the plant.

Working of the Plant.

The plant is a very flexible one and can be ready for gas-making in 8 hours from cold. The cycle of the plant can be varied at will to suit the class of coal being used or the quality or quantity of gas desired, but a normal cycle will be: 1¼ min. blow; 2½ min. up run; and 1½ min. down run; or 1½ min., 2 min., 2 min. depending whether maximum quality or quantity is required.

Owing to the plants being usually of larger capacity than the daily output demands, the procedure of shutting down at night is often employed, and on starting up the operator puts the plant in the charging position, opens the bottom doors, drives false bars in at the top of the clinkering door, and cleans out the grate from any clinker which is on the walls. On withdrawal of the bars the auxiliary machinery is started, the plant put into cycle, and gas-making commenced, steam being kept down to 10 lb. for the first half-hour and then gradually brought up to normal.

The mechanical operator automatically changes the cycle from run to blow, and during the blast period air is conveyed to the generator through a welded steel main, each generator having three air valves—(1) the primary, which supplies air to the bottom of the grate; (2) the secondary, situated above the nostril holes by which a certain amount of air is admitted into the checker work to burn off the produced gas and so heat the retort portion of the generator; (3) the tertiary, which is only on plants with waste-heat boilers and situated at the top of the generator, which also admits a certain amount of air to burn off any remaining producer gas in the boiler. At the end of the blow period the mechanical operator automatically shuts the blast valves, opens the up-run valve, and turns the steam on to the bottom of the plant, and then reverses the run of the gas by opening the down-run valve and shutting the up-run valve and steam. There is a short run to purge the generator before going again on the blow, and the operator attends to this as well.

When the man on duty wishes to charge the plant he sets the lever on a small diaphragm governor connected between the blast main and operator which drops a small plunger into a slot on the timing wheel and keeps it stationary; this completes the cycle. The generator requires to be emptied and clinkered every three months.

Gas and By-Products.

The time of gas-making cycle affects both the quantity and quality of the gas produced. The results of a test recently carried out on Lumphinnans Doubles might be interesting, and spot tests carried out on different days with the same coal, cycle, and amount of steam are given below:

—	No. 1.	No. 2.	No. 3.
CO_2	3·9	4·5	3·9
O_2	0·2	0·2	0·15
CO	35·6	33·5	34·3
CH_4	5·52	5·53	5·93
C_nH_m	0·4	0·7	0·95
H_2	49·6	50·08	50·88
N_2	4·58	5·49	3·89
C.V.	336·7	338·0	353·0

Make per ton, 54,000 to 49,000 cu.ft.
Cycle, 1½ min. blow; 2 min. up-run; 1½ min. down-run.
Steam, 90 lb.; blast pressure, 10 in.

Owing to the design of plant a true sample of ammoniacal liquor could not be taken, but as far as can be judged ammonia content will be low. The tar produced is of a very thick nature and if allowed to get cold cannot be pumped from the well.

Discussion.

Mr. REA asked the size of plant to which Mr. Scott referred in his Paper. He noticed from the analysis that the percentage of inerts was low. At Perth they got about 17,500 cu.ft. of gas per ton (from vertical retorts) and, say, 12 cwt. coke. If they used the coke to make blue water gas of about 295 B.Th.U. they would obtain a total thermal yield of 192 therms, against Mr. Scott's 176 therms. This was an approximation only, of course, and he thought that size of plant would affect the comparison.

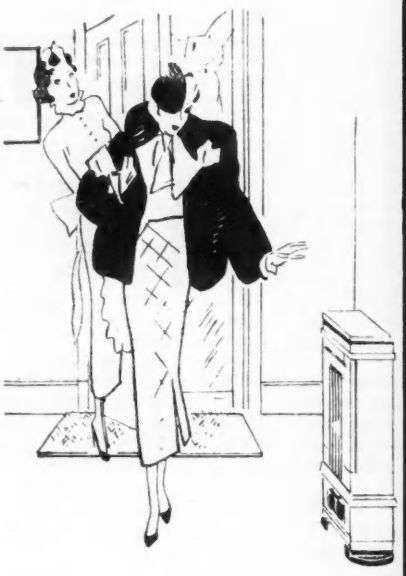
Mr. RICHMOND (Penicuik) said that Tully plants appeared to be more popular in Scotland than in England. He could think of many reasons for preferring a Tully plant, such as limited ground space, peak loads, poor coke markets, and so on.

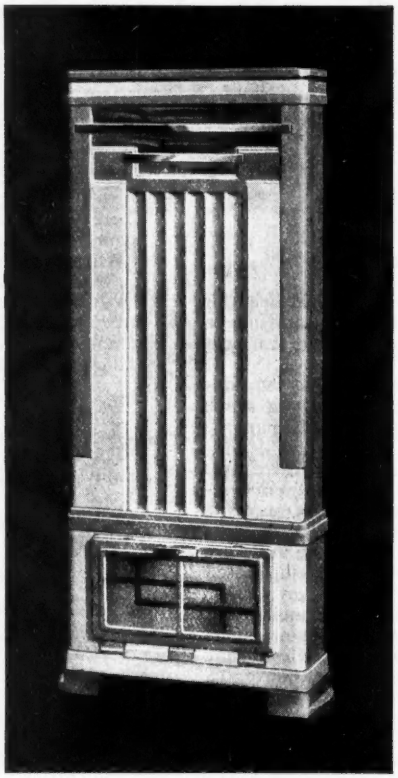
Mr. GILCHRIST (Tranent) said that at Prestonpans they had the first all-Tully gas plant. There were two units each of 300,000 cu.ft. per day capacity, and they had given every satisfaction.

Mr. COWIE (Hawick) said he had heard that smoke trouble was sometimes experienced and this was often due to choked secondary air nostrils. He thought that trouble from dust was often a drawback with this plant.

Mr. SCOTT, replying, said that the plant in question was of 150,000 cu.ft. per day capacity. He thought that this type of plant was only for small works. For the larger works, verticals were preferable. With regard to Mr. Richmond's comments, he thought that coal was the trouble experienced south of the Border; a medium caking coal had to be used in the plant. Mr. Cowie was right about the smoke during blow caused by choked secondary air nostrils. If a dust interceptor were put in there was no trouble due to dust.

The Ideal Gas Heater for





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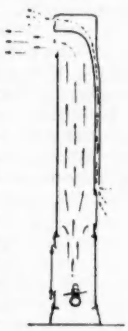
TWO GREAT IMPROVEMENTS

Two very important developments have been achieved in the VELOMAIN Space Heater. The design ensures that the top and back do not become unpleasantly hot, while the heat is projected into the room at such an angle as to prevent discoloration of the walls or ceiling immediately behind or above the heater, thus obviating one of the greatest drawbacks found in the ordinary radiator of the past.

NOTE THESE UNIQUE PRINCIPLES



1. The large volume of pure air mixed with the heat stream issues horizontally from the Heater and so quickly warms the apartment.
2. The front body of the Heater is evenly warmed throughout its length.
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Scottish Juniors Short Paper Meeting Continued.

AIDS FOR RETORT HOUSE AND LABORATORY.

By WILLIAM MASTERTON, B.Sc.Tech., of Edinburgh.

Device to Indicate Immediately Stoppage of the Coke Extractor in Vertical Retorts.

The coke extractor is liable to accidental stoppage either by failure of the motive power driving it or to the transmission belt coming off the pulley. The extractor shaft not being very conspicuous its stoppage may not be noticed for some time—indeed, the first warning that it has stopped may be the observation that the recording calorimeter on the "makes" shows a bad fall in calorific value.

The appliance described here gives the alarm the moment the failure occurs so that it can be remedied at once and no harm is done.

Some years ago I devised the coupling of a Pickering governor with a switch, so that in the event of stoppage of

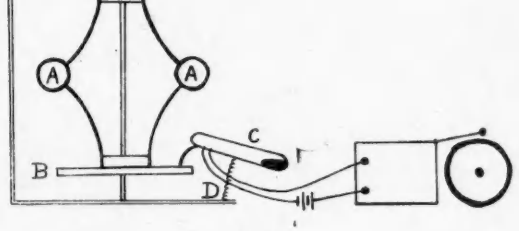

Fig. 1.

the governor the switch would be closed and thereby operate some alarm. The device was described in the *Industrial Chemist* for April, 1933. I fitted up a small preliminary model, using a disused gramophone governor and a small mercury-enclosed switch operating an electric bell. The device, which is self-explanatory, is shown in fig. 1. As long as the governor is rotating the weights A are thrown apart by centrifugal force and the bottom plate B is lifted while the mercury enclosed switch C is maintained in the open position. Stoppage of the governor results in B falling and the spring D brings the switch down into the closed position with the result that the bell rings.

The management at Granton decided to adopt the idea and a full-scale appliance was made and erected, using a Pickering governor from a disused engine. The arrangement using the Pickering governor has the advantage that the plate against which the switch rests is stationary—being the steam valve in its previous use.

The mercury enclosed form of switch was adopted as being the surest form of switch for the dusty condition of the retort house and the alarm used is the Klaxon horn.

The governor is driven from a high speed point after the transmission belt so that whatever the reason for stoppage the fact of stoppage will make itself evident.

The appliance has been in use in Granton Gas-Works since June, 1935, and has always given satisfaction.

Table to Facilitate Interpolation of Gas Volume Factors.

In the tables of logarithms of gas volume factors issued by the Gas Referees the values are given for barometer readings to every 0·1 in. mercury and to every whole degree Fahrenheit (except at the extreme of high and low temperature, where they are given to every 2°). For accurate work it is necessary to interpolate to find the value correct to 0·01 in. mercury and 0·1° F. The process of interpolation can be facilitated by the use of the tables which I have worked out and which I hope will prove useful to all who do C.V. determinations. Table 1 relates to that portion of the Referees' table of log. factors in which the temperature is expressed for every one degree. Table 2 relates to the extremes where temperatures are expressed for every two degrees.

The manner of use is as follows: Suppose it is desired to find the log. gas volume factor for 29·14 in. bar. and 51·6° F. Referring to the Referees' table we find we have to interpolate between these four figures.

0·0027	..	0·0048
0·0011	..	0·0033

We now select the bottom left-hand one of the four—viz., 0·0011, and add to it a correction obtained from Table 2. The value of the bar. (29·14) in the final place is, of course, "0·04," and of the temperature (51·6), "1·6." Looking therefore in Table 2 under 0·04 bar. and 1·6 temperature we obtain the figure 0·0026. This is added to our 0·0011, giving 0·0037 as the interpolated value.

Table 1 is used in a similar manner.

Table 1 is constructed on the assumption that the vertical difference in the log. tables is 0·0015 and the horizontal difference 0·0012; Table 2 assumes respective differences of

TABLE 1.

Temp. / Bar.	0·0	0·1	0·2	0·3	0·4	0·5	0·6	0·7	0·8	0·9	0·10
0·00	0·0015	0·0016	0·0017	0·0019	0·0020	0·0021	0·0022	0·0023	0·0025	0·0026	0·0027
0·01	0·0014	0·0015	0·0016	0·0017	0·0018	0·0020	0·0021	0·0022	0·0023	0·0024	0·0026
0·02	0·0012	0·0013	0·0014	0·0016	0·0017	0·0018	0·0019	0·0020	0·0022	0·0023	0·0024
0·03	0·0011	0·0012	0·0013	0·0014	0·0015	0·0017	0·0018	0·0019	0·0020	0·0021	0·0023
0·04	0·0009	0·0010	0·0011	0·0013	0·0014	0·0015	0·0016	0·0017	0·0019	0·0020	0·0021
0·05	0·0008	0·0009	0·0010	0·0011	0·0012	0·0014	0·0015	0·0016	0·0017	0·0018	0·0020
0·06	0·0006	0·0007	0·0008	0·0010	0·0011	0·0012	0·0013	0·0014	0·0016	0·0017	0·0018
0.07	0·0005	0·0006	0·0007	0·0008	0·0009	0·0011	0·0012	0·0013	0·0014	0·0015	0·0017
0·08	0·0003	0·0004	0·0005	0·0007	0·0008	0·0009	0·0010	0·0011	0·0013	0·0014	0·0015
0·09	0·0002	0·0003	0·0004	0·0005	0·0006	0·0008	0·0009	0·0010	0·0011	0·0012	0·0014
0·10	0·0000	0·0001	0·0002	0·0004	0·0005	0·0006	0·0007	0·0008	0·0010	0·0011	0·0012

TABLE 2.

Temp. / Bar.	0·0	0·1	0·2	0·3	0·4	0·5	0·6	0·7	0·8	0·9	1·0	1·1	1·2	1·3	1·4	1·5	1·6	1·7	1·8	1·9	2·0
0·00	0·0015	0·0016	0·0017	0·0018	0·0019	0·0020	0·0021	0·0022	0·0023	0·0024	0·0026	0·0027	0·0028	0·0029	0·0030	0·0031	0·0032	0·0033	0·0034	0·0035	0·0036
0·01	0·0014	0·0015	0·0016	0·0017	0·0018	0·0019	0·0020	0·0021	0·0022	0·0023	0·0024	0·0025	0·0026	0·0027	0·0028	0·0029	0·0030	0·0031	0·0032	0·0033	0·0035
0·02	0·0012	0·0013	0·0014	0·0015	0·0016	0·0017	0·0018	0·0019	0·0020	0·0021	0·0023	0·0024	0·0025	0·0026	0·0027	0·0028	0·0029	0·0030	0·0031	0·0032	0·0033
0·03	0·0011	0·0012	0·0013	0·0014	0·0015	0·0016	0·0017	0·0018	0·0019	0·0020	0·0021	0·0022	0·0023	0·0024	0·0025	0·0026	0·0027	0·0028	0·0029	0·0030	0·0032
0·04	0·0009	0·0010	0·0011	0·0012	0·0013	0·0014	0·0015	0·0016	0·0017	0·0018	0·0020	0·0021	0·0022	0·0023	0·0024	0·0025	0·0026	0·0027	0·0028	0·0029	0·0030
0·05	0·0008	0·0009	0·0010	0·0011	0·0012	0·0013	0·0014	0·0015	0·0016	0·0017	0·0018	0·0019	0·0020	0·0021	0·0022	0·0023	0·0024	0·0025	0·0026	0·0027	0·0029
0·06	0·0006	0·0007	0·0008	0.0009	0·0010	0·0011	0·0012	0·0013	0·0014	0·0015	0·0017	0·0018	0·0019	0·0020	0·0021	0·0022	0·0023	0·0024	0·0025	0·0026	0·0027
0·07	0·0005	0·0006	0·0007	0·0008	0·0009	0·0010	0·0011	0·0012	0·0013	0·0014	0·0015	0·0016	0·0017	0·0018	0·0019	0·0020	0·0021	0·0022	0·0023	0·0024	0·0026
0·08	0·0003	0·0004	0·0005	0·0006	0·0007	0·0008	0·0009	0·0010	0·0011	0·0012	0·0014	0·0015	0·0016	0·0017	0·0018	0·0019	0·0020	0·0021	0·0022	0·0023	0·0024
0·09	0·0002	0·0003	0·0004	0·0005	0·0006	0·0007	0·0008	0·0009	0·0010	0·0011	0·0012	0·0013	0·0014	0·0015	0·0016	0·0017	0·0018	0·0019	0·0020	0·0021	0·0023
0·10	0·0000	0·0001	0·0002	0·0003	0·0004	0·0005	0·0006	0·0007	0·0008	0·0009	0·0011	0·0012	0·0013	0·0014	0·0015	0·0016	0·0017	0·0018	0·0019	0·0020	0·0021

0·0015 and 0·0021—an assumption sufficiently near correct for all practical purposes.

Discussion.

Mr. DAVIES (Perth) said that there was one system he knew of where the coke extractor device would not be of service; he referred to the old Glover-West type of extractor gear in which the transmission was by means of a rope drive.

Mr. LIVINGSTONE (Alloa) mentioned the device which had been developed in an English works making use of a pair of bellows with an escapement, so that in the event of failure of the engine the bellows closed and completed an electrical circuit in which was incorporated an alarm.

Mr. WILSON (Perth) described the alarm used at Perth on compressors; it was fitted to the pressure gauges, so that in the event of the pressure falling below or rising above predetermined values audible warning was given.

Trade Notes

Gas Chambers and Coke Ovens, Ltd.

The new telephone number of Gas Chambers and Coke Ovens, Ltd., Artillery House, Westminster, S.W. 1, is Abbey 6912.

United Steel Companies, Ltd.

The Birmingham Office of the United Steel Companies, Ltd., was recently moved from the old Martino Steelworks in Princip Street to a modern suite of offices in the centre of the city. The new address is Union Chambers, Temple Row, Birmingham, and the telephone number is Midland 6321.

Tar Distillation Plant.

In connexion with the erection of a central tar distillation factory near Caerphilly, South Wales, we learn that the Powell Duffryn Associated Collieries, Ltd., have placed the contract for the complete tar distillation plant with the Chemical Engineering and Wilton's Patent Furnace Company, Ltd. The contract includes pipe stills embodying the Wilton system of re-circulation and fractionation in a single column. The capacity of the plant, we understand, will be 1,000 tons of crude tar per week.

A Portable Bookkeeping Machine.

Many proprietors of small businesses have erroneously gained the impression that mechanical bookkeeping is only possible in large banks and commercial houses. They will be interested to know that a new electric desk model bookkeeping machine—occupying less space than a typewriter—has been introduced by Burroughs Adding Machine, Ltd. It offers all the advantages of an up-to-date accounting system to those firms whose figure work is comparatively small or to large concerns who want to speed up departmental efficiency.

On this machine ledgers are posted and balanced daily; statements are automatically prepared and ready for despatch at any time. It can also be used as a fast adding machine. The simple "Short-cut" keyboard enables anyone to operate the machine efficiently without special training.

The "Rototherm" Thermometer.

"The Secretary of State may, by regulations, for factories or for any class or description of factory or parts thereof, prescribe a standard of reasonable temperatures . . . and direct that thermometers shall be provided and maintained in such places and positions as may be specified."

The foregoing is an extract from the Factories Act, 1937, which comes into force as from July 1 next. The section relating to the provision of thermometers can be complied with simply enough by the fitting of such instruments at suitable points throughout a building. The essence of the matter lies, however, in the readiness with which the thermometers can be read in order that the temperature may be adjusted to meet the regulations. There are few of us who have not at some period or another struggled to decipher the reading of a vertical type thermometer, with its column of mercury exasperatingly elusive except when viewed from the right angle. Such difficulty does not arise with the "Rototherm" instrument with its direct reading "clock" face and temperatures clearly set out round the circumference.

These thermometers, which are manufactured by the British Rototherm Company, Ltd., are available in a number of types and sizes from a small "household" instrument with 2½ in. dial to an 18 in. model suitable for large factories and entrance halls, which can be read at a distance of 65 ft. All these models, giving direct Fahrenheit readings from 20° to 140°, have a rapid reaction to temperature changes and are provided with means for easy fixing on walls. They are also supplied in various metal or coloured finishes, while some are available with a combined humidity indicator. Dials can also be supplied with Centigrade readings.

Gas Undertakings' Results

Andover.

Inaugurated in June, 1838, the current year marks an important epoch in the history of the Andover Lighting and Power Company, and the centennial period finds the Undertaking enjoying that steady prosperity to which gas shareholders are so well accustomed. The Works were officially opened on Oct. 15, 1838, since when a constant and satisfactory supply of gas has been maintained, and the Works have been kept thoroughly well up-to-date. For the year 1937 the Directors recommend the usual dividend of 6% per annum on the ordinary shares, and they report good results from the year's working. They have thus been enabled to liquidate the balance of the Suspense Account, which has now been closed. The sale of gas increased by nearly 4%. The total quantity sold was 72,300,100 cu.ft., or 361,501 therms.

Commercial.

The dividend of the Commercial Gas Company for the year 1937 is maintained at 5%, and the Directors report that the Revenue Account shows a profit for the year of £129,133, which compares with £128,473 for 1936. The total quantity of gas charged for in 1937 was slightly less at 15,324,595 therms (as against 15,411,490 therms), and the receipts from this source were some £8,000 down at £520,146. Savings on manufacture and distribution about balanced this falling off, and small variations under some other headings were met by an increase in the returns from residual products. Under rentals, the largest decrease is in respect of prepayment meters and fittings—from £33,322 to £28,810. The net capital expenditure during the year was trifling, and the amount of capital over-spent carried to the balance-sheet is merely increased by £1,198, to £167,503. There are also accounts due to the Company totalling £151,060, while on the other side of the balance-sheet figures a temporary loan of £300,000. Expenditure in suspense and balances on hire-purchase account come to about £90,000. The Reserve Fund and the Special Purposes Fund total £132,563. After the payment of the final dividend, the balance to be carried forward will be £2,133, which compares with £4,530 brought in. The Directors found it necessary to increase the price of gas by 0·25d. per therm, to 9·25d., as from the Lady Day quarter, and to 9·7d. per therm as from the Christmas quarter. Owing to continued ill-health, Dr. Charles Carpenter resigned from the Chairmanship of the Company in the early part of the year.

[It will be greatly appreciated if subscribers will kindly forward Reports and Accounts in duplicate.]

London and Southern Juniors

Visit to Watson House

Some 160 members of the London and Southern District Junior Gas Association paid a visit to Watson House, the Headquarters of their President, Mr. R. N. LeFevre, of the Gas Light and Coke Company, on Feb. 2.

Prior to the inspection of the Research and Training Sections, the visitors were entertained at luncheon—Mr. STEPHEN LACEY, Controller of Gas Sales, presiding, supported by Mr. C. A. Masterman and other senior officers of the Company. In welcoming the Association, Mr. Lacey remarked that one among them that day—he did not know who—represented the ten thousandth visitor to Watson House since that Centre had been transferred from the old premises at Nine Elms. He could not imagine, he said, a body of visitors more deeply concerned with or more actively interested in what was going on at Watson House than their Association. In addition to a large number of their members who were personally engaged in the work that was being done at Watson House, most of the remainder were closely associated with the Industrial Centre whose activities were carried on there. So they were all co-partners in this enterprise. In conclusion, Mr. Lacey proposed the toast of the "London and Southern District Junior Gas Association," coupled with the name of their President.

The PRESIDENT thanked Mr. Lacey and Mr. Masterman for their presence on that occasion and asked the former to convey to the Governor and Directors of the Gas Light and Coke Company the Association's appreciation not only of their kindness in permitting this visit but also of their generous hospitality.

After a few words from Mr. LeFevre on the subject of what they would see during their inspection of Watson House, the visitors were divided up into parties and proceeded upon a thorough tour of the premises—which were described in detail in the "JOURNAL" for Dec. 9, 1936, and June 9, 1937. At the conclusion of the tour, the visitors were entertained at tea, and a most interesting afternoon was brought to a close.

COMPANY MEETING

The Gas Light and Coke Company

The Two Hundred and Thirty-First Ordinary General Meeting of the Gas Light and Coke Company was held on Friday, Feb. 4, at Gas Industry House, 1, Grosvenor Place, London, S.W. 1—Sir DAVID MILNE-WATSON, Bt., LL.D., D.L., the Governor, presiding.

The SECRETARY (Mr. Brian Wood) having read the notice convening the meeting,

The GOVERNOR said: Ladies and Gentlemen,—With your permission I propose to take the report and accounts as read, and will proceed immediately to deal with the details of the accounts. You will see from the capital account that we have spent £10,000 on lands; £32,000 on buildings and machinery; £203,000 on mains and service pipes; £373,000 on meters and £719,000 on stoves—a total of £1,337,000. Against this expenditure we have written off £781,000, the principal items being meters £247,000 and stoves £487,000.

During the year we received the balance of the proceeds of the issue of the £2,993,000 3¼ per cent. Redeemable Preference Stock (1970), and the new capital is brought into the capital account for the first time. In the present circumstances the Directors do not anticipate exercising the shareholders' authority to raise additional loan capital this year.

Revenue Account.

Coming to the revenue account, it is gratifying to record that sales of gas have gone up by 1·32 per cent. or about three-and-a-quarter million therms, a figure which is even better than it looks, as I shall explain later. The increase brought in an additional revenue of about £100,000. The rental of meters and stoves shows an increase of £71,000; coke and breeze are both very satisfactory markets and brought in an additional £319,000; tar products show an increase of £56,000.

On the debit side of the account, coal cost us more by £221,000; oil cost less by £6,000, not because of any reduction in the price of oil, but because we got a better price for our oil tar. Coke and breeze for water gas show an increase, not because more was used, but because the price was higher. Repairs and maintenance of works and plant cost more by £262,000. You will be glad to know that the works are in a first-class condition. It is the policy of the Directors to keep the works thoroughly up to date, and in this connexion they are, at the present time, reconstructing Kensal Green Gas-Works. The works at Southend, to which I referred last year, are now nearing completion, and the carbonizing plant is giving very satisfactory results.

The items of expenditure grouped under the heading "Distribution" all show increases totalling £147,000. Here, as well as under certain of the items of manufacture, we have felt part of the effect of the increases in wages and materials, to which I shall refer again, but the full effect of these increases remains to be sustained in 1938.

Result of Year's Operations.

The result of the working of the year is as follows: The balance transferred from the revenue account to the profit and loss is £2,050,000, as against £2,093,000 for the previous year. This balance, after adding the sum of £336 received from H.M. Treasury under the Development Act, 1929, and after allowing for interest on borrowed money for the year and dividends distributed in respect of the June half-year, leaves a sum of £851,000 out of which to pay dividends for the December half-year. This sum enables the Directors to recommend—the dividend on the new 3¼ per cent. Redeemable Preference Stock (1970); the usual dividends on the 4 per cent. Consolidated Preference Stock, and the 3½ per cent. Maximum Stock; and a dividend (unchanged) at the rate of £5 12s. per cent. per annum on the Ordinary Stock.

The payment of these dividends, together with the necessary contribution of £20,000 to the Redemption Fund in respect of the half-year ended December last, will absorb £749,000, leaving £102,000 to be carried forward to the credit of the current year's accounts, as against £213,000 carried forward on the last occasion. The explanation of the reduction in the carried-forward figure is bound up with the question of the price of gas, to which I will refer in a few moments.

Balance-Sheet.

With regard to the balance-sheet, you will see that at the end of the year we had a loan of £550,000 from our bankers. This is accounted for by temporary loans made to a subsidiary undertaking of the Company which are included *per contra* under the heading "Sundry Accounts." You will notice that the total amount now outstanding under the heading of "Sundry Appliances, &c. (Deferred Payments)," has increased by £1,400,000, making a total of £4,750,000.

Up to the present our Hire Purchase business shows no sign of slackening, and we have, therefore, to contemplate possibly for some years yet a gradual growth in this item, the size of which is eloquent testimony to the tremendous demand for gas-burning appliances of all kinds which we are having to meet. I do not think there are any further items that call for comment on the accounts.

Gas Industry House.

We meet here to-day at Gas Industry House because our offices in Horseferry Road are now no more. We reluctantly came to the conclusion that our old offices were completely out-of-date. We had already pulled down two gasholders and we are now in possession of a vacant site on part of which we intend in due course to erect new offices, which we hope will be worthy as the headquarters of our great Company. Gas Industry House, where we have met to-day, was opened nearly a year ago by Mr. Walter—now Lord—Runciman, then President of the Board of Trade. It is the home of the national Gas Industry and we are the landlords. We are very glad to have as our tenants the principal national bodies connected with the Industry.

The Price Increase.

At the end of the year the Directors, with great reluctance, decided that it would be necessary to raise the price of gas. During the year the cost of the raw materials which we use, other than coal, went up by 15 per cent., also wages increased by 6 per cent. under the national agreement, and in the circumstances it became necessary to put up the price of gas by 0·3d. per therm. This advance barely covers the increase in the costs to which I have already referred, and as I said at the time, it only means ½d. a week to the average automatic consumer and 1d. a week for an ordinary consumer whose gas bill is 25s.-30s. a quarter. So it is really a very small addition to the cost.

In a time of rising costs it is almost impossible to avoid a time lag in the adjustment of price, and as you can see, the result in this case is that the proprietors have, in effect, suffered a loss of £100,000 which is reflected in the reduction of the amount carried forward.

Genuine Expansion of Business.

The sale of gas for the year showed, as I have mentioned, an increase of 1·32 per cent. over the preceding year. One of the greatest of all factors affecting the demand for gas is the weather, or, to speak more strictly, the temperature. With all our personal efforts, it still remains true that Jack Frost is the Company's best salesman. [Laughter.] 1937 was on the whole a warmer year than its predecessor, and the increase in the figures indicates, therefore, a larger genuine expansion in our business than the percentage I have quoted. Moreover, 1936 was a leap year, and therefore con-

tained an extra day, so that the 1937 increase indicates a steady and continued rise in our sales, which is a source of great satisfaction to us. We obtained an increase in the year, even though it was short by one day. The increase represents in absolute quantity a vast amount of heat.

Effect of More Efficient Appliances.

And there is another point. Recently our increases have been achieved in the face of the enormous change-over from older to newer and more efficient appliances in all parts of our area. Hundreds upon hundreds of thousands of older appliances have come in and been replaced by up-to-date apparatus of greatly improved design, giving the same amount of effective heat for a gas consumption of anything from 10 per cent. to 25 per cent. less. This has been, in a short term sense, a drag on the wheels of our progress, drawing us back all the time, by the introduction of apparatus which reduces the consumption of gas. We strive, however, to give the public the best service we can, and we know that we are entrenching ourselves by securing the satisfaction of our customers. Now we have reached a point where reasonably complete replacement of older appliances is in sight. For this reason I believe that during the coming years we may see from all the constructive work that has gone to the building up of the Company's business more obvious results. In other words, the "drag" is coming to an end.

Findings of the Joint Committee on Charges.

At the beginning of the year the Government decided, in view of a protest which had been made regarding the introduction of a new tariff in South London, that an enquiry should be held into the whole system of gas charges. A strong Joint Committee from the Lords and Commons was appointed, with Sir Alan Anderson as Chairman. That Committee, after having held 12 sittings and hearing much evidence from the London County Council (whose main proposal was that a tribunal should be set up with power to review the flat rate price for gas) and from other municipalities, from representatives of the Gas Company south of the Thames chiefly concerned, and from the National Gas Council, came to the following important conclusion:

> That the basic price and dividend system afforded adequate protection to the consumer having regard more especially to the competition to which gas companies are subject and that no new formula is needed or indeed can be found which would look after the interests of both gas companies and their consumers.

This Committee was not only drawn from the House of Commons and the House of Lords, but it was drawn from all political parties in the House of Commons.

Especially they repudiated the claim of the local authorities that no increase of price should be permitted without an enquiry by the local authorities, and emphasized more than once the effectiveness of public opinion as a check on unreasonable charges to consumers.

Unavoidable and Unfair Handicaps.

In fact, most of the points which the industry has striven in recent years to bring to the notice of Governments and Parliament were set out by the Committee as its own considered and unanimous findings after thorough investigation. Not only did the report emphasize the national importance of the industry in peace and war, but it drew attention to some of the avoidable and unfair handicaps under which we are made to operate as an industry, and expressed its opinion about them in the following memorable words:

> "It is contrary to public interest to lay burdens on gas to which electricity is not subject, or even to permit gas as the older of two competitors to suffer any longer than is necessary from adhesions of restraint because of a monopoly which it once enjoyed but has lost."

It could not have been very much better than that.

Coal Position.

Turning now to the coal position, I regret to say that the fears which I expressed when addressing you a year ago, about the dangers to which we in common with all other users of coal were exposed by reason of the operation of the revised coal selling schemes, have in no way been allayed. Indeed, the manner in which the coalowners have during the past 12 months exercised the monopolistic powers which they now possess, combined with the introduction of a Coal Bill which proposes to extend these powers for a further five years, has caused widespread and genuine alarm among all classes of coal-users.

Throughout the country the price of coal has been considerably, and in many instances heavily, increased. Difficulties have been experienced in getting the classes of coal required, and in obtaining satisfactory delivery. The Committees of Investigation which purport to offer a means of redress to aggrieved consumers have proved entirely ineffectual. In consequence, many trades and industries have already been hit, and the cost of living has been increased, while the upward trend of coal prices continues unabated. Yet the Bill to which I have referred, while proposing to allow a state of affairs which I can only describe as disastrous to continue for a further five years, offers no effective protection to consumers. It is true that under the Bill the Committees of Investigation are to be somewhat strengthened and that a central Appellate Tribunal is to be set up, but as a practical means of remedying grievances these bodies will have very little more value than their predecessors.

Opposition to the Bill.

It is not surprising, therefore, that the Bill has evoked the strongest opposition from many of the country's most important industries, as well as from the public utilities and the Association of Municipal Corporations, which are in a better position than others who are not less affected to estimate the great danger of continuing an uncontrolled monopoly in the sale of a commodity which is indispensable to all.

In my view, and it is shared by a large number of those in responsible positions who have given much anxious thought to the question, it is the monopoly itself which should be regulated. Its obligations to consumers should be strictly defined by Parliament. In the past when Parliament has authorized monopolies or semi-monopolies, it has not failed to regulate them in such a way as to ensure that there can be no exploitation of the public by those to whom they have been granted.

Our own Company is a case in point, and the same is true of other gas undertakings as well as of railway, water, and, to some extent, electricity undertakings. In each of these cases the rights conferred are hedged about with statutory restrictions which give protection to those using the services offered.

Monopoly Contrary to National Interest.

It is surely contrary to the national interest that the monopoly in the sale of coal should alone escape regulation, and it cannot be beyond the wit of man to devise a scheme whereby such regulation might satisfactorily effect its purpose without interfering with the right of the coalworker to a reasonable wage. It has been done in other cases, and it can be done, I am quite sure, in the case of coal.

I sincerely hope, therefore, that the Government will see the wisdom of accepting the suggestion which has already been put forward that Part I. of the Coal Mines Act of 1930 which deals with this question should only be continued for such a period as will enable them to bring in further remedial legislation in the interests of consumers generally. In my judgment the coal question is one of the most important matters of home policy which has ever come before Parliament.

Problem of the Smoke Cloud.

Thoughtful citizens of London have had in mind recently the problem of the smoke cloud which disfigures our City, blights the health of many of its citizens by cutting off the vital rays of the sun, and wastes millions of money annually in destroying buildings. Smoke abatement is a cause with no opponents in theory, but few exponents in practice. We have had inspiring utterances from Government spokesmen, but no attempt to use the power of the State to tackle the main element in the problem—the domestic chimney. Local authorities' representatives have on occasion said all the right things; but as landlords they do not always practise what they preach.

London can congratulate itself on some diminution of its smoke pall during the last generation or so, and gas and electricity are

largely responsible for what has been done. Every extension of the Company's business marks progress in the right direction, but as a matter of public policy it is clearly wrong that we should have to do it without the powerful support that public authority could give, which would speed-up and cheapen the process of changing over to completely smokeless domestic fuel systems for London.

I am pleased to note that a move is now on foot which may lead to the formation of a London Regional Advisory Committee on Smoke Abatement. It may be that there are some who question the successful outcome of a move like this, because they doubt the practicability of smoke abatement. I personally do not doubt the practicability of smoke abatement. I will go further; I do not doubt the practicability of smoke abolition. If the State and the local authorities will take counsel seriously with the fuel industries of the country, and if this good cause is favoured with a fraction of the thought, effort, and money that goes into some other causes—not all of them as worthy—I believe that in a very few years we shall see substantial smoke abatement in London, and that total abolition can follow not long after. I am not suggesting any Utopian attempt to induce the conservatively minded British householder to give up his solid fuel fire on the hearth. No such programme is necessary; smokeless solid fuel is available in various forms, chief amongst which is coke. Let the consumer be free to choose so long as he chooses smokelessly. [Laughter.]

Vast Size of Company's Business.

The vast size which the Company's business has now attained may be illustrated by some figures. We now have over 1,650,000 separate accounts on our books—an increase in 1937 of some 47,000 accounts. The task of handling these accounts is, of course, a colossal one, and the Rental Department, which is charged with it, has an efficiently mechanized system of records and accountancy housed on the river bank at Imperial House, Fulham, adjoining our research and testing station, Watson House.

The Rental Department has to deal with transactions respecting over two million appliances on the district; there are some 1,330,000 appliances on hire, and roughly 750,000 on hire-purchase. But even these colossal totals represent only a portion of the Rental Department's concerns. In 1937 it handled the charges for 409,000 tons of coke, which was about 25,000 tons more than the preceding year. The number of separate individual orders received for coke was roughly 676,000, 50 per cent. of them being received over the telephone by a staff specially trained for that purpose. Over 6,200 of these orders were successfully handled in one day, the peak day of the year. Even over the Christmas holidays a small staff had to remain at their posts to cope with deliveries. On Christmas morning we delivered to one consumer a very small quantity of coke, his only order for the year, for, as he explained, he did not normally use solid fuel, but he had a number of friends coming in that day who would prefer a solid fuel fire. [Laughter.] Our Transport Department delivered it, and delivered it cheerfully; a little sidelight on what public utility service means. The accounts of the Company's ordinary consumers are dispatched by post, and the Rental Department handles between 7,000 and 8,000 such accounts every weekday.

The figures in connexion with the collection of slot meter consumers' accounts are even more vast; they are literally astronomical. In 1937 the Company's staff collected from prepayment meters 700 million pennies and 25 million shillings.

Model Housing Estate.

Last year I was able to report the impending completion of the Company's Model Housing Estate at Kensal Green, which was built and is managed for us by the Capitol Housing Association. It was opened by Sir Kingsley Wood, the Minister of Health. Sir Kingsley Wood told me himself that he was delighted with what had been done, and that he was very pleased to be there. Great interest has been displayed in Kensal House by many of those for whose information and interest it was planned. It has been studied as a going concern by Local Authorities and Housing Societies, architects, housing experts, educationists, social workers, and others.

We have made a film about the Estate, which, with our other films, has already been shown in London and throughout the country to large numbers of experts and some hundreds of thousands of members of the public. Already, therefore, after less than one year of its official life the Estate has succeeded in bringing to the notice of those most concerned what is meant in working-class housing by a genuinely smokeless modern fuel system. That system has proved up to the hilt all our claims for it; its effect on the lives of tenants in greater leisure, lighter labour, and lower bills has been most striking.

The tenants' average consumption of gas and coke—that is, the solid fuel used there, because it is smokeless—for the very full service which the Kensal House equipment provides represents under the appropriate two-part tariff an average fuel bill of less than 4s. 6d. weekly, which is substantially less than what the average London working-class household pays for the average inadequate, dirty, and laborious fuel service. Not only have greater ease and lower costs benefited the daily lives of the tenants, but the change worked by the new home circumstances, and particularly by the régime of the Nursery School, on the health, appearance, and general development of the children is something to rejoice the heart of anyone who has seen it.

Appeal for Open Mind.

It has been said that one of the biggest problems in the regulation of modern society is to shorten the time-lag which exists between making an important discovery and the general application of it in practice to the public benefit. I confess I have often wondered how long the time-lag will be before the working-class and the community at large is benefiting practically by the general adoption in our housing programmes of something like the Kensal House system. It might be said that Kensal House, as the product of one particular fuel industry, is a biased demonstration; on the other hand, there it is for anyone to come and see for himself and to ask the tenants questions about.

All the facts are known, all the cards are on the table, and the results of the first year's working are such as I have described. If other housing estates in London with other types of fuel system will offer the same full and frank information about the service provided and the tenants' fuel bills the experts will be able to compare and judge. May I express the hope that all those whose concern it is to deal with these questions may scrutinize the facts with the open-minded attention they deserve.

Increased Demand for Appliances.

The most important feature of the appliance sales returns is that the net increase in the number of gas appliances on the district—the excess of those going out over those coming in—shows a considerable rise over last year, and is, I think, the largest increase on our records. In 1937 our total of gas appliances rose by 274,000, against a rise of 217,000 in the preceding year. By far the greater part of the increase was made up of appliances representing an important usage of gas by the consumer—cookers, refrigerators, water heaters, wash coppers, and fires.

The return of the older type of black cookers from the district dropped by approximately 100,000 in 1937 compared with 1936; but the reason is a good one—there are not so many left. The Company's prepayment consumers number close on a million. Three or four years ago the great majority had the old-type black cookers in their kitchen; to-day a very heavy reduction has been made in their number, and only a fraction of the original quantity remains.

Refrigerators.

The activities undertaken by the Company in the sale of Electrolux refrigerators, which began in 1935, continued their successful course last year. Despite the exceptional difficulties of a summer season which included the London bus strike and a good deal of dull weather, sales showed a very useful increase over the preceding year. We have now some 40,000 gas refrigerators installed on our area, and an investigation last year shows that in the three years since we seriously tackled this important new market we have done substantially more than half the total business effected in household refrigerators on our district.

Up to the present it appears to have been generally accepted that a refrigerator was not appropriate for inclusion as part of the standard equipment of the type of flat or house which is provided by housing authorities. This is not a view that I share, for I regard the refrigerator as even more important in a small house (where economy and elimination of waste are all important and there is less room for the satisfactory storage of food) than in a large one. Therefore, this Company is making every effort to induce local authorities and others responsible for housing schemes to introduce refrigerators as a part of the equipment of an up-to-date workman's home.

Advantages of Co-operation.

The refrigeration campaigns for the past two years, along with a number of other publicity and sales campaigns in the same period, have been carried out, not by the Gas Light and Coke Company alone, but by a large and growing number of companies in the London and Home Counties working co-operatively. I have on previous occasions expressed the view that such co-operative action by gas companies on a regional basis, adopting common price policies, common marketing methods, and common publicity campaigns, is one of the most important and hopeful developments in the Industry, and an excellent and necessary supplement to the general national propaganda of the British Commercial Gas Association.

The so-called London Group has now carried out five campaigns, with varying degrees and methods of co-operation, but all in a true sense joint efforts. The latest development is that the rather loose and informal method of association which has necessarily obtained during the experimental period of this work is now to give place to a more systematic form of association.

Industrial Business.

The industrial business of the Company continues to increase, and each week adds to our records some notable contract for the supply of gas for furnace work or industrial heat treatment in some form. We are particularly pleased with the fact that one by one the great national newspaper offices in modernizing their plant and equipment call in Mr. Therm, not merely for the important heat processes connected with the handling of metal in newspaper production, but increasingly also for the heating, water heating, and air conditioning of their buildings. *The Times* is the latest addition to those who are in the very full sense our Fleet Street clients; the list includes the *Daily Telegraph and Morning Post, Daily Mail, Daily Express, Sunday Dispatch,* and *Sunday Express, Evening Standard,* and *Evening News.*

Our growth in business in the hotel and catering industries is another thing that affords us particular satisfaction. Not only is it valuable in itself, but it is a valuable demonstration to the public of the opinion that is held on gas for cooking by experts whose business it is to weigh up every detail of comparative performance and cost before making a choice. The great metropolitan firms of caterers, the big West End hotels, and world-famous restaurants in central London have a highly expert judgment of what really good cooking is, and how it is to be achieved; they go into questions of cost with a magnifying glass, because marginal differences might lead in their case to very big figures. You will be gratified, therefore, to know that almost every big hotel and restaurant, and all the great chain catering establishments of London, use gas for the whole, or the great bulk, of their cooking. ["Hear, hear."]

Street Lighting.

One section of our business in which we always shall be especially interested is street lighting. It is, so to speak, very much in the public eye, and competition is extremely keen. The Company continues to hold its own, and the very large share of London's street lighting for which it is responsible does not diminish. During the year under review it obtained ten additional long-term agreements, two for 15 years, five for 10 years, and three for 5 years. The sale of gas for public lighting showed an increase of some 130,000 therms compared with the preceding year.

Research Work.

New developments are also always taking place with regard to tar. I am glad to say that the company has made considerable advance in the application of thin tar carpets to road surfaces. This particular form of road treatment was developed in the first instance by our friends the bitumen people, but we are now in a position to make an equally good carpet. We hope in this way to encourage still further use of tar on our roads. We are naturally very desirous that our completely British product should be used as far as possible on our roads, for reasons which I think are quite obvious. It is true that this country is not making any attempt to be entirely self-supporting, as are some other countries in Europe. At the same time, there is no doubt that with the world as we find it to-day it is most desirable that our country should be as independent as it can be of imported goods required for national purposes.

For the same reason we are increasing our production of benzole. There is now very little of this Company's gas that is not washed to take out the benzole, which incidentally is the only British motor spirit available, with the exception of a small quantity that is made by hydrogenation and by low-temperature carbonization.

The Company is continuing and increasing its research work not only into our primary product—gas—but into our various by-products. At Watson House a great deal of useful work is being done by research into gas-using apparatus and appliances. Great advances continue to be made in design and applicability.

We have in all branches of our work an extremely capable staff of scientific researchers, and we are always very glad to give the benefits of our research to the Industry as a whole.

Welfare.

During the year a hospital scheme for the benefit of the Company's employees has been put into operation, thus rounding-off our many activities for their welfare. This scheme appears to be highly popular, which augurs well for its future success. It is also a very good scheme for the hospitals.

In this connexion the Company recently acquired a house at Ramsgate, which has been converted into a hostel for convalescent men. It is pleasantly situated in a quiet part of the town, and its advantages are being much appreciated by those who require a period of rest before returning to their work.

There are now 19,192 co-partners in the Company's service, holding £1,012,998 of the Company's Ordinary stock, a very fine figure.

Co-partnership is now a recognized feature of the Gas Industry. I cannot escape the feeling that in this matter of co-partnership the Gas Industry has something to teach the wider world of industry. The Industrial Co-partnership Association deserves every encouragement in its splendid efforts to make this principle more widely known.

Retirement of Mr. Galbraith.

The Directors deeply regret that, owing to ill-health, Mr. W. L. Galbraith, who had been Secretary to the Company for 19 years, had to resign his position. He was a most loyal officer to the Company, and was very popular with all ranks. His genial, kindly personality will be much missed by all. ["Hear, hear."]

Mr. Brian Wood has been appointed as his successor. He has been with the Company, in the secretarial department, for a number of years, and I am sure we have found a very good man for the post.

The Directors' thanks are due to all ranks of the Company's staff, from the highest to the lowest, for their zeal and energy during the past year. With this I formally beg leave to move:

> "That this Meeting do agree with and confirm the Report of the Directors and the Auditors' Report and Statement of the Accounts of the Company for the year ending on the 31st December, 1937."

But before putting the resolution to the meeting I shall be happy to hear any remarks which proprietors may wish to make, and to endeavour to answer any questions they may ask.

The DEPUTY-GOVERNOR (Mr. Henry Woodall, M.Inst.C.E.) formally seconded the motion.

Mr. RAFFETTY said he would like personally to thank the Governor for having in his Address paid a tribute to the work of the Industrial Co-Partnership Association, of which he (the speaker) happened to be Chairman. He wished to acknowledge the strong and unvarying support which the Company had given to the work of this Association. When proprietors received their dividends, they would have the added gratification of feeling that, in the course of the earning of this dividend, satisfaction was being widely spread among the employees, and that the successful example of the Company was giving encouragement throughout the whole field of industry. ["Hear, hear."]

Several proprietors asked questions, to which the Governor replied.

The motion for the adoption of the report and accounts was then put to the meeting and carried unanimously.

Dividend Minute.

The SECRETARY then read the Minute of the Court of Directors, dated Jan. 21, 1938, recommending Dividends for the past half-year.

RESOLVED.—That it be recommended to the Ordinary General Meeting of Proprietors to be held on the 4th February next that (1) dividends as follow for the half-year ending the 31st December, 1937, be declared, viz.:

	£	s.	d.	
On the 4% Consolidated Preference Stock at the rate of	4	0	0	per cent. per annum.
On the 3½% Redeemable Preference Stock, 1970, at the rate of	3	15	0	„ „
On the 3½% Maximum Stock at the rate of	3	10	0	„ „
On the Ordinary Stock at the rate of	5	12	0	„ „

All subject to deduction of Income-Tax.

(2) In accordance with the provisions of Part III. of the Company's Act, 1931, the sum of £20,000 be set aside towards the Redemption Fund.

The GOVERNOR: I beg to move the adoption of that recommendation.

The DEPUTY-GOVERNOR seconded the resolution, which was carried.

Elections and Thanks.

Moved by the GOVERNOR, and seconded by the DEPUTY-GOVERNOR, the retiring Directors (the Viscount Mersey and Sir Harold Brewer Hartley) were re-elected, the Governor remarking that they both served the Company admirably.

Thereafter the Auditors (Messrs. P. H. Ashworth and H. E. Ibbs) were re-appointed, on the motion of Mr. H. L. MANN, seconded by Mr. T. C. CLAXTON.

Mr. H. RAYNER, proposing a hearty vote of thanks to the Governor, Directors, Officers, and Employees of all grades, said that this really seemed to be an inadequate acknowledgment of their services in having long ago established the Company in a very strong position, in which they had maintained it ever since; but the proprietors could at least make the vote a very hearty one. They all realized that in Sir David Milne-Watson they had an exceptional Governor—[" Hear, hear "]—backed up by Directors who were all men of distinction in their respective spheres, and fully qualified to direct the activities of this great undertaking. All their efforts, however, would be without avail, if they were not supported wholeheartedly by the officers and rank and file, so that the vote would be incomplete if they were not included. The struggle, not for supremacy, but for the just rights and status of gas in the industrial world, seemed to grow keener and keener as time went on, and when they were reading their daily newspapers they could hardly fail to note with admiration how strongly the Directors of that Company fought for these rights and that status. Thus they could rest assured that, in the hands of the Directors, the interests of the Company would be always stoutly maintained. [Applause.]

Mr. F. LOCKET, in seconding the vote, associated himself entirely with the remarks of the mover.

A PROPRIETOR remarked that the thanks of all were also due to Mr. Galbraith, for his very long service as Secretary to the Company.

The vote having been warmly accorded,

The GOVERNOR, in acknowledgment on behalf of himself, his fellow Directors, and all associated with the Company, said it was very encouraging, when one faced the proprietors at these annual meetings, to have such proof of their satisfaction and confidence. They were often criticized in other directions, and it was therefore doubly pleasing to meet at yearly intervals a contented body of proprietors. It was the intention of all those working for the Company to display in the future the same zeal as had been exercised in the past.

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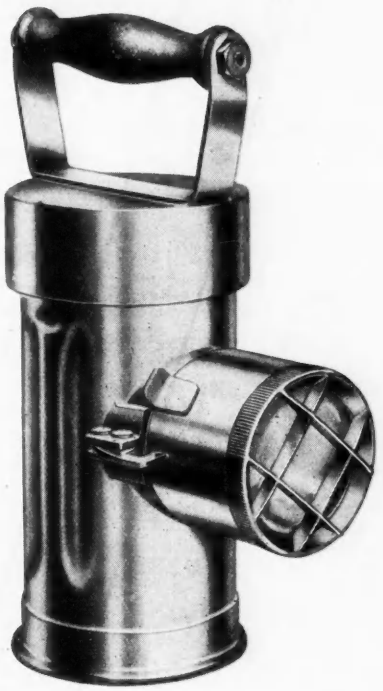

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carrying full official approval for use in Towns Gas, Hydrogen, Petroleum and other Highly Inflammable atmospheres.

Fitted with NIFE Steel Plate Accumulator as standardised in Admiralty handlamps and thousands of Miners' Lamps throughout the World.

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TRIALS GLADLY ARRANGED.

BATTERIES LIMITED
HUNT END WORKS REDDITCH

The new Cannon V-Inclined Gas Fire is enjoying an unqualified success all over the country. The proved principle of its construction is a distinct contribution to the advance of Gas as a safe, comfortable, healthy and economical means of domestic heating. You can sell a V-Inclined Gas Fire against any other form of heating any time. You will remember that it warms outwards, upwards and sideways. Details and technical data from the

CANNON IRON FOUNDRIES LTD.
DEEPFIELDS
Nr. BILSTON
STAFFS

CANNON INCLINED
GAS FIRES

Markets and Manufactures

Current Sales of Gas Products

The London Market

LONDON, *Feb.* 7.

Prices of tar products in the London market remain steady at the following levels:
Pitch, 38s. per ton f.o.b.
Creosote, 5⅞d. to 6d.
Refined tar, 3¼d.
Pure toluole, 2s. 2d. to 2s. 3d.
Pure benzole, 1s. 8d.
95/160 solvent naphtha, 1s. 7d.
90/160 pyridine, 10s. to 11s.
All per gallon naked at makers' works.

The Provinces

Feb. 7.

The average prices of gas-works products during the week were: Gas-works tar, 24s. to 29s. Pitch—East Coast, 38s. to 39s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 38s. to 39s.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 5½d. to 1s. 6d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 5d. to 5½d.; low gravity, 4⅞d. to 4½d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 3s. 3d. to 3s. 6d. Naphthalene, £13 10s. to £16. Salts, 80s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable.

* All prices for pitch are now quoted on the basis o f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, Feb. 5.

Business is still very slow, although, on the whole, quotations are fairly well maintained. In certain products, however, a discount can be arranged with firm business in hand.

Crude gas-works tar.—Actual value is 37s. to 38s. per ton *ex* works in bulk.

Pitch is still quiet at 28s. to 30s. per ton, f.o.b. for export, and round 28s. per ton *ex* works in bulk for home trade.

Refined tar.—Home price is fixed at 3¾d. to 4d. per gallon, and export value is still called 3d. to 3¼d. per gallon, both *ex* works in buyers' packages.

Creosote oil.—There is an easier tendency with to-day's quotations as follows: Specification oil, 4¾d. to 5d. per gallon; low gravity, 6d. to 6¼d. per gallon; neutral oil, 5d. to 5¼d. per gallon, all *ex* works in bulk.

Cresylic acid.—Very little business is being arranged and the following prices are purely nominal: Pale, 97/99%, 2s. 9d. to 2s. 11d. per gallon; dark, 97/99%, 2s. 7d. to 2s. 9d.; and pale, 99/100%, 3s. to 3s. 9d. per gallon; according to quality, all *ex* works in buyers' packages.

Crude naphtha.—Available supplies command 6d. to 6½d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is unchanged at 1s. 5½d. to 1s. 6½d. per gallon, and 90/190 heavy naphtha at 1s. 1d. to 1s. 2d. per gallon.

Motor benzole is steady at 1s. 4½d. per gallon.

Pyridine.—Supplies are scarce and values are nominal at 12s. to 12s. 6d. per gallon for 90/160 grade, and 13s. to 14s. per gallon for 90/140 grade.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.	
Crude benzole..	0	9½	to	0	10	per gall. at works
Motor " ..	1	3	"	1	3½	" " "
90% " ..	1	4	"	1	4½	" " "
Pure " ..	1	8	"	1	8½	" " "

Contracts Advertised To-Day

Mantles.
Stoke-on-Trent Gas Department. [p. 406.]

Meters.
Manchester Gas Department. [p. 406.]

Oils and Greases.
Stoke-on-Trent Gas Department. [p. 406.]

Oxide of Iron.
Manchester Gas Department. [p. 406.]

Stores.
Stoke-on-Trent Gas Department. [p. 406.]

Tubes and Fittings.
Stoke-on-Trent Gas Department. [p. 406.]

Applications for Patents

HELPS, G.—Gas fires. No. 1959.
RADIANT HEATING, LTD., AND DOCKING, A.—Gas heating devices. Nos. 2391, 2392.
RADIATION, LTD., YATES, H. J., AND HARTLEY, H.—Gas fires. No. 1885.
RADIATION, LTD., YATES, H. J., HARTLEY, H., AND BROWN, A.—Hotplates. No. 1886.
RIGHTON, W. J.—Geysers. No. 1926.

Dividend Announcements

Metropolitan Gas Company of Melbourne.—Interim of 6s. 6d. Sterling per share, payable Feb. 15.

Tottenham and District.—In respect of the half-year ended Dec. 31, 1937, at the rates of 5%, 5¼%, and 6% per annum on the preference stocks and £6 15s.% per annum on the ordinary stock, all less income-tax (same).

Woking District.—For the half-year ended Dec. 31, 1937, £11% per annum on the "A" ordinary stock, £7 14s.% per annum on the "B" ordinary stock, £5% per annum on the "C" preference stock, and £4% per annum on the 4% preference stock (same).

PROTECT WITH

METROTECT

a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
REGIS HOUSE,
KING WILLIAM STREET,
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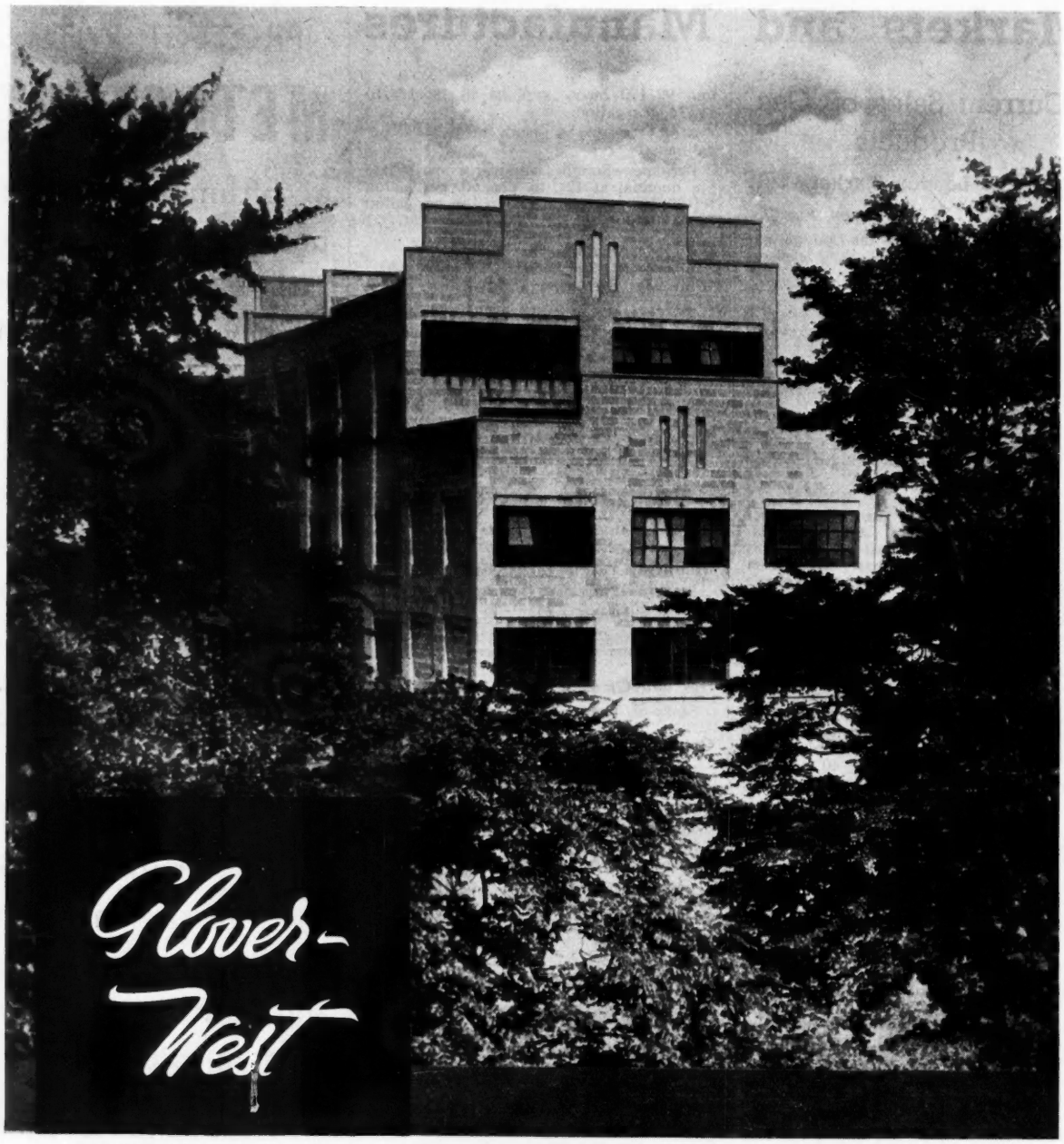

CONTINUOUS CARBONIZATION IN VERTICAL RETORTS

The illustration shows the Glover-West vertical retort house and coke grading plant built for the Buxton Corporation Gas Department, of typical modern exterior design.

415 plants
built or in construction in
24 countries

WEST'S GAS IMPROVEMENT CO. LTD.,
MANCHESTER: Albion Ironworks, Miles Platting ■ LONDON: Columbia House, Aldwych, W.C.2

GAS STOCKS AND SHARES

Markets continue to be dominated by conditions on Wall Street and business last week, with the exception of one department, was still quiet despite the attractive level of prices. The exception once again was the gilt-edged market, and here prices were firm throughout the week, especially 2½% Consols which closed 32s. 6d. higher than a week ago. In all other sections business was distinctly flat and prices generally closed lower. The Bristol Corporation loan was a great success; the issue was enormously over-subscribed and the price immediately went to 10s. premium. Further Corporation new issues are expected shortly. Most of the home railway dividend announcements, which are awaited with interest, will be made during the current week.

The demand for gilt-edged and other high-class investments gave a fillip to the Gas market and good support was forthcoming. Ordinary stocks were still *cum div.*, and several strengthened a point or two, including Alliance and Dublin, South Metropolitan, and Tottenham.

A further small drop occurred in Imperial Continental to 127-132, and business was actually recorded at 127, an absurdly low price for the security offered. Since the capitalized bonus of 100% in 1932 the Company's dividend record on the doubled capital has been as follows: 1932-3 to 1934-5, 12%; 1935-6 to 1936-7, 10% (4 and 6); 1937-8 interim, 4% actual. At the time of writing, a parcel of this stock is on offer at 131 to give a yield on a 10% dividend basis of £7 12s. 8d.%.

Among the final ordinary dividend announcements to appear last week were the following, all of which are at the same rates as a year ago.

——	1st Half.	2nd Half.	Year 1937.
	%	%	%
Bath	2½	3	5½
Newcastle	2½	2⅞	5⅜
Romford	4	4	8
Southampton	2½	2½	5½
Tottenham	3⅜	3⅜	6¾
Woking "A"	5½	5½	11
" "B"	£3 17s.	£3 17s.	£7 14s.
Wolverhampton	3½	3½	7

The shares and debenture stock of the Associated Gas and Water undertakings are now officially quoted and have therefore been transferred from the Supplementary List, while to the latter have been added some of the preference and debenture issues of the Cardiff, Croydon, and Lea Bridge Companies.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 4.	Rise or Fall on Week.
1,767,439	Sept. 6	8	8	Alliance & Dublin Ord. ...	160—165	+2
374,000	Dec. 13	4	4	Do. 4 p.c. Deb. ...	95—100	...
558,190	Nov. 15	5	5	Assed. Gas & Water U'd'ts Ord.	18/6—20/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/-	...
216,041	,,	—	§-/4	Do. 4 p.c. Red. Cum. Pref.	19/—20/-	...
278,590	,,	§-/2½	-/4	Do. 4 p.c. Irred. Cum. Pref.	17/—19/-	...
500,000	Sept. 6	§35/—	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
558,890	Aug. 9	7	7	Barnet Ord. 7 p.c.	158—163	...
300,000	Oct. 4	1/9¾	1/4½	Bombay, Ltd.	26/—28/—	...
179,915	Aug. 9	9½	9½	Bournemouth sliding scale ...	200—205	...
590,407	,,	7	7	Do. 7 p.c. max. ...	158—163	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	133—138	...
50,000	Dec. 13	3	3	Do. 3 p.c. Deb. ...	78—83	...
262,025	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Aug. 9	7½	7½	Brighton, &c., 6 p.c. Con. ...	150—155	...
649,955	,,	6¾	6¾	Do. 5 p.c. Con. ...	133—138	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	127—133	...
855,000	Sept. 20	8	7	British Ord.	140—145	...
100,000	Dec. 13	7	7	Do. 7 p.c. Pref.	140—145	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
100,000	22 May'33	6	4	Cape Town, Ltd.	1½—2½	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1½—3½	...
150,000	Dec. 13	4½	4½	Do. 4½ p.c. Deb. ...	70—75	...
626,860	July 19	6	6	Cardiff Con. Ord.	125—130	...
237,860	Dec. 13	5	5	Do. 5 p.c. Red. Deb.	106—111	...
98,936	Oct. 4	2/-	2/-	Colombo Ord....	1⅞—1⅞	...
24,510	,,	1/4½	1/4½	Do. 7 p.c. Pref.	23/6—25/6	...
739,453	Oct. 4	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	17/—19/-	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	22/—24/-	...
1,775,005	Aug. 9	5	5	Commercial Ord.	85—90	...
620,000	Nov. 29	3	3	Do. 3 p.c. Deb. ...	73—78	...
286,344	Aug. 23	5	5	Do. 5 p.c. Deb. ...	115—120	...
807,560	Aug. 9	7	7	Croydon sliding scale... ...	140—145	...
644,590	,,	5	5	Do max. div.	110—113	...
620,385	Dec. 13	5	5	Do. 5 p.c. Deb.	115—120	...
239,000	Aug. 9	5	5	East Hull Ord. 5 p.c.... ...	98—103	...
185,355	Aug. 9	6	6	East Surrey Ord. 5 p.c. ...	120—125	...
176,211	Dec. 13	5	5	Do. 5 p.c. Deb. ...	112—117	...
250,000	Nov. 15	7	4	Gas Consolidation Ord. ...	19/6—21/6	...
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	18/6—20/6	...
19,223,324	Aug. 9	5⅜	5⅜	Gas Light & Coke Ord. ...	24/—25/-a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	84—87	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref.	100—103	...
2,993,000	Jan. 17	...	3½	Do. 3½ p.c. Red. Pref.	101—103*	...
8,602,497	Nov. 29	3	3	Do. 3 p.c. Con. Deb.	81—84	+1
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb.	112—115	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb.	110—113	...
700,000	Sept. 6	3½	3½	Do. 3½ p.c. Red. Deb.	98—101	...
270,466	Aug. 23	6	6	Harrogate New Cons. ...	115—120	...
157,500	April 5	1/2⅜	1/2⅜	Hong Kong and China Ord	¾—1	−¼
213,200	Aug. 9	6	6	Hornsey Con. 3½ p.c. ...	118—123	...
5,600,000	Nov. 1	12	8	Imperial Continental Cap. ...	127—132	−1
223,130	Jan. 17	3½	3½	Do. 3½ p.c. Red. Deb. ...	88—93*	...
285,242	Aug. 9	8½	8½	Lea Bridge 5 p.c. Ord. ...	170—175	...
11,751	Aug. 23	10	8	Maidstone 5 p.c. Cap.... ...	180—190	...
63,480	Dec. 13	3	3	Do. 3 p.c. Deb. ...	70—75	...
75,000	Nov. 29	†10	†10	Malta & Mediterranean ...	145—155	...
392,000	Oct. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—103	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 4.	Rise or Fall on Week.
231,977	Aug. 23	5	5	M.S. Utility 'C' Cons. ...	101—106	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref.	196—101	...
360,075	Dec. 13	4	4	M.S. Utility 4 p.c. Deb. ...	97—102	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
675,000	Nov. 15	†9	†6	Montevideo, Ltd.	82—87	−3
250,000	Aug. 9	7½	7½	North Middlesex 6 p.c. Con.	147—152	...
396,160	Aug. 9	5	5	Northampton 5 p.c. max. ...	110—115	...
300,000	Oct. 18	†7	†9	Oriental, Ltd.	153—158	...
468,537	Dec. 13	8	8	Plymouth & Stonehouse 5 p.c.	154—159	...
621,667	Aug. 9	8½	8½	Portsmouth & Gosport Cons.	164—169	...
241,446	,,	5	5	Do. 5 p.c. max. ...	104—109	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...
247,966	Dec. 13	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	Jan. 17	4	4	Do. 4 p.c. Red. Deb. ...	95—100*	...
15,000	Sept. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	9—9½	...
441,275	Sept. 20	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/6—23/6	...
460,810	,,	-/10½	-/10½	,, ,, 4½ p.c. Cum. Pref.	19/6—21/6	...
133,201	Aug. 23	5	8½	Shrewsbury 5 p.c. Ord. ...	130—135	...
9,000	June 7	4	4	South African Ord.	3¾—4¾	...
1,371,752	Sept. 6	1/2½	1/2⅝	South East'n Gas Cn. Ld. Ord.	23/—25/-	...
871,636	,,	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	20/—22/-	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/-	...
450,000	Aug. 9	4	4	Do. 4 p.c. Deb.	99—102	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
6,709,895	Aug. 9	6	5	South Met. Ord.	107—110	+2
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pf. ...	131—136	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pf. ...	98—101	...
1,895,445	Dec. 13	3	3	Do. 3 p.c. Deb. ...	74—79	...
1,000,000	Jan. 17	5	5	Do. 5 p.c. Red. Deb....	109—112*	...
1,543,795	Aug. 9	6	6	South Suburban Ord. 5 p.c. ...	120—125	...
512,825	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...
500,000	,,	4	4	Do. 4 p.c. Pref....	95—100	...
250,000	,,	...	§18/9	Do. 3½ p.c. Red. Pref.	99—102	+1
888,587	Dec. 13	5	5	Do. 5 p.c. Deb....	115—120	...
250,000	,,	4	4	Do. 4 p.c. Deb....	97—100	...
200,000	Sept. 20	...	3½	Do. 3½ p.c. Red. Deb.	94—99	...
427,859	Nov. 1	1/2½	9½	S. Western Gas & Water Ord.	18/6—20/6	...
160,523	,,	-/10⅛	-/10½	Do. 4½ p.c. Red. Cum. Pf.	19/6—21/6	...
110,000	Dec. 13	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...
750,541	Aug. 9	5½	5	Southampton Ord. 5 p.c. ...	111—116	...
148,836	Dec. 13	4	4	Do. 4 p.c. Deb.	96—101	...
350,000	Aug. 23	5½	5½	Swansea 5½ p.c. Red. Pref. ...	110—115	...
94,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100*	...
1,076,490	Aug. 9	6½	6½	Tottenham and District Ord.	132—137	+1
409,835	,,	5½	5½	Do. 5½ p.c. Pref....	121—126	...
62,235	,,	5	5	Do. 5 p.c. Pref....	109—114	...
371,850	Dec. 13	4	4	Do. 4 p.c. Deb....	97—102	...
85,701	July 19	‡6	6	Tuscan 6 p.c. Red. Deb. ...	96—101	...
888,629	Oct. 4	6	4	U. Kingdom Gas Cor. Ord....	19/—21/-	...
937,743	Nov. 15	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	20/—22/-	...
500,000	,,	...	-/1·15	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/-	...
745,263	Dec. 13	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/6—18/6	...
1,000,000	Sept. 20	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
373,939	Aug. 9	7	7	Uxbridge, &c., 5 p.c.	138—143	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...
1,371,138	Aug. 9	7	7	Wandsworth Consolidated ...	140—145	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	99—102	...
1,343,964	Dec. 13	5	5	Do. 5 p.c. Deb. ...	115—120	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	97—102	...
558,342	Aug. 9	7	7	Watford and St. Albans Ord.	140—145	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	109—114	...
200,000	,,	5½	5½	Do. 5½ p.c Pref. ...	121—126	...
200,000	Nov. 29	4	4	Do. 4 p.c. Red. Deb.	95—100	...
100,000	,,	3½	3½	Do. 3½ p.c. Red. Deb.	94—99	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Feb. 4.	Rise or Fall on Week.
202,152	Sept. 6	25/–b	5	Ascot Ord.	100—105	...
128,182	Dec. 13	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Aug. 23	...	-/4½	Associated Utilities 4 p.c. Pref.	16/6—18/6	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb....	95—100	...
17,000	Aug. 3	8	8	Bognor Orig. Ord. 'A' ...	160—170	...
62,210	,,	8	8	Do. New Addl. 'A' ...	160—170	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	141—146	...
37,440	Aug. 9	10	10	Cam. Univ. & Town10 p.c. max.	193—203	...
125,970	,,	7	7	Do. 7 p.c. max.	135—140	...
39,025	,,	5	5	Do. 5 p.c. max.	98—103	...
96,410	July 19	4½	4½	Cardiff 4½ p.c. Pref.	97—102	...
150,000	Aug. 9	4	4	Croydon 4 p.c. Pref.	97—101	...
130,000	Dec. 13	4	4	Do. 4 p.c. Deb.	97—102	...
65,000	Aug. 9	8½	7½	Eastbourne 'A' 5 p.c. ...	158—163	...
198,000	,,	7	6	Do. 'B' 3½ p.c.	128—133	...
112,312	,,	5	5	Do. 5 p.c. Pref.	108—113	...
130,000	Dec. 13	5	5	Do. 5 p.c. Deb.	113—118	...
24,000	Aug. 23	8½	8½	Great Yarmouth 8½ p.c. max.	44—49	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	34—39	...
51,160	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
152,600	Sept. 6	9	8	Guildford Cons.	170—175	...
54,055	,,	5	5	Do. 5 p.c. Pref.	110—115	...
68,250	Dec. 13	5	5	Do. 5 p.c. Deb.	112—117	...
156,600	Aug. 23	7½	7½	Hampton Court Cons. ...	145—155	...
80,000	Aug. 9	4	4	Lea Bridge 4 p.c. Pref ...	95—100	...
60,000	,,	6	6	Do. 6 p.c. Pref. ...	125—130	...
94,876	Dec. 13	4	4	Do. 4 p.c. Deb. ...	97—100	...
73,620	Sept. 6	8¾	8¾	Luton Cons. 'A'	163—168	...
107,960	Sept. 20	5½	4	Mid Kent Ord.	8¾—9¾	...
230,940	Aug. 9	10	10	Oxford & District Ord. ...	205—210	...
47,112	,,	5	5	Do. 5 p.c. Pref.	108—113	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	110—115	...
126,193	Nov. 15	7½	7½	Peterborough Ord.	158—163	...
64,990	Sept. 6	7½	6½	Redditch Ord....	125—135	...
166,850	Aug. 9	8	8	Romford Ord....	155—160	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Sept. 20	5	5	Do. 5 p.c. Deb.	113—118	...
25,570	Aug. 9	5½	5½	Rugby 5½ p.c. Pref.	125—130	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	106—111	...
42,750	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
10,950	Aug. 23	8	8	Ryde Ord.	158—163	...
270,086	Sept. 6	7	7	Slough Ord.	133—138	...
21,000	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	Nov. 1	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/–	...
28,866	Sept. 6	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
137,730	Aug. 9	7	7	Southgate & Dist. 7 p.c. max.	140—145	...
62,500	,,	5	5	Do. 5 p.c. Pref.	110—115	...
117,228	Aug. 23	5	5	Swindon Cons.	106—111	...
60,425	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
64,380	Dec. 13	5	5	Torquay and Paignton 5 p.c. Pf.	108—113	...
33,858	Nov. 15	...	-/2·70c	United Kingdom Gas Corpn. 4½ p.c. 1st Cum. Pref. ...	20/—22/–	...
130,000	Aug. 9	8	5	Wakefield Ord.	120—125	...
81,650	,,	5	5	Do. 5 p.c. max.	103—108	...
82,000	Aug. 9	6	6	Weymouth Ord.	103—108	...
98,384	Aug. 9	6	6	Wolverhampton 6 p.c. Pref....	120—125	...
160,000	Dec. 13	5½	5½	Do. 5½ p.c. Rd. Db.	107—112	...
90,000	Dec. 13	5	5	York 5 p.c. Red. Deb.... ...	104—109	...
133,640	July 19	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	128—133	...
120,000	,,	5	5	Do. 5 p.c. Pref.	108—113	...
35,000	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	121—126	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 4.	Rise or Fall on Week.
347,756	July 19	6	5	Bath Cons.	120—122	...
1,667,250	July 19	5	5	Bristol, 5 p.c. max.	117—119	...
120,420	Dec. 13	4	4	Do. 1st 4 p.c. Deb. ...	100—102	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100—102	...
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	July 19	5	5	Newport (Mon.) 5 p.c. max....	100—102	...
13,200	Sept. 6	8	7	Pontyp'l Gas & W. 10 p.c. 'A'	13—14	...
13,600	,,	6	5	Do. 7 p.c. 'B'	11⅞—12⅜	...
40,000	,,	6	5	Do. 7 p.c. 'C'	11⅞—12⅜	...
140,778	Aug. 9	5	5	Weston-super-Mare Cons. ...	110—112	...
64,338	Jan. 3	4	4	Do. 4 p.c. Deb.	94½—96½	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	154—157	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 4.	Rise or Fall on Week.
157,150	Aug. 9	6½	5	Chester 5 p.c. Ord.	106—110	...
92,500	Dec. 13	4	4	Do. 4 p.c. Pref.	96—100	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	88—91	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Aug. 23	6	6	Liverpool 5 p.c. Ord.... ...	125½—127½	+1
245,500	Dec. 13	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...
306,083	Jan. 17	4	4	Do. 4 p.c. Deb.	100—102*	...
106,280	Aug. 9	10	10	Preston 'A' 10 p.c.	206—216	...
188,219	,,	7	7	Do. 'B' 7 p.c.	147—157	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 4.	Rise or Fall on Week.
122,577	Aug. 9	8	8	Blyth 5 p.c. Ord.	165—166	...
732,000	Aug. 9	5	5	Hartlepool G. & W. Cn. & New	112—114	...
2,061,315	Aug. 9	5⅝	5	Newcastle & Gateshead Con.	23/6—24/-a	...
682,856	,,	4	4	Do. 4 p.c. Pref. ...	98—100	...
776,706	Jan. 3	3½	3½	Do. 3½ p.c. Deb. ...	89½—90½	...
277,285	Nov. 1	5	5	Do. 5 p.c. Deb. '43...	103—105	...
332,351	Aug. 23	6	6	Sunderland 6 p.c. max. ...	140—142	...

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 4.	Rise or Fall on Week.
542,270	Aug. 9	9	6	Derby Con.	135—145	...
55,000	Dec. 13	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 13	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Feb. 4.	Rise or Fall on Week.
10,000	Sept. 20	10	10	Great Grimsby 'A' Ord. ...	210—220	...
6,500	,,	10	10	Do. 'B' Ord. ...	210—220	...
79,000	,,	10	10	Do. 'C' Ord. ...	205—210	...
1,806,339	Aug. 23	6	6½	Sheffield Cons.	144—148	...
95,000	Jan. 3	4	4	Do. 4 p.c. Deb.	100—103	...

a The quotation is per £1 of Stock. § Actual for Quarter. c Actual. * Ex div.

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